30th Virtual UNISEC-Global Meeting Aerospace activities at UIS University in Colombia

Julián Rodríguez Ferreira PhD
Professor, head of Semillero de Cohetería UIS Aeroespacial
Universidad Industrial de Santander jgrodrif@uis.edu.co

UNISEC GLOBAL
University Space Engineering Consortium

Virtual – February 18th 2023

Scope

Experience in FRANCE

Research at UIS: Semillero de cohetería UIS Aeroespacial

- **Education**
- **Outreach activities**
- **Research**

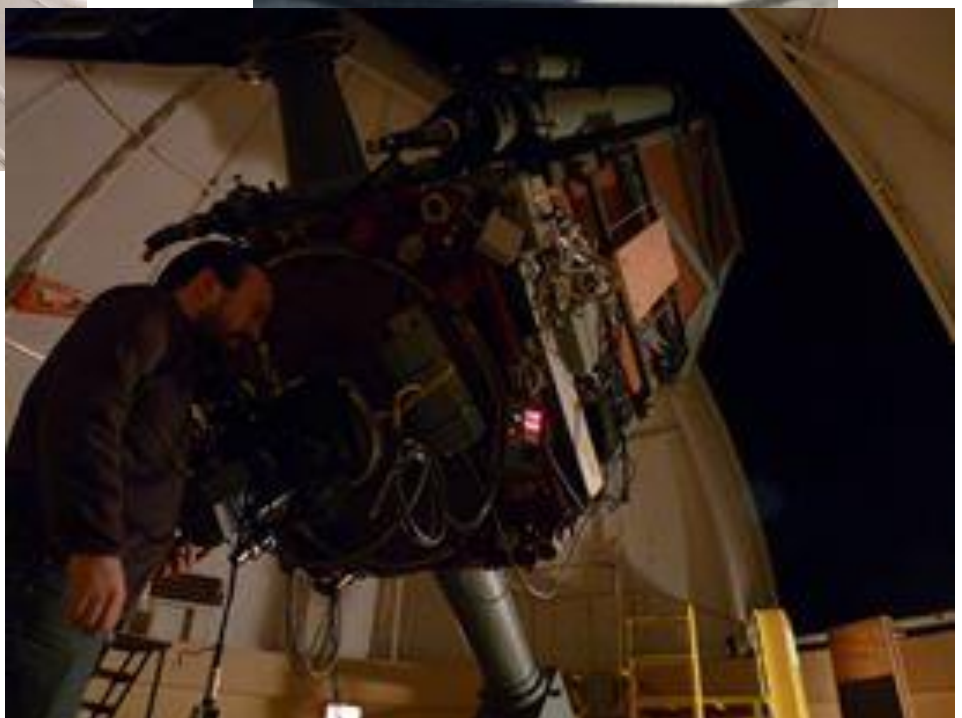
BEPICOLOMBO

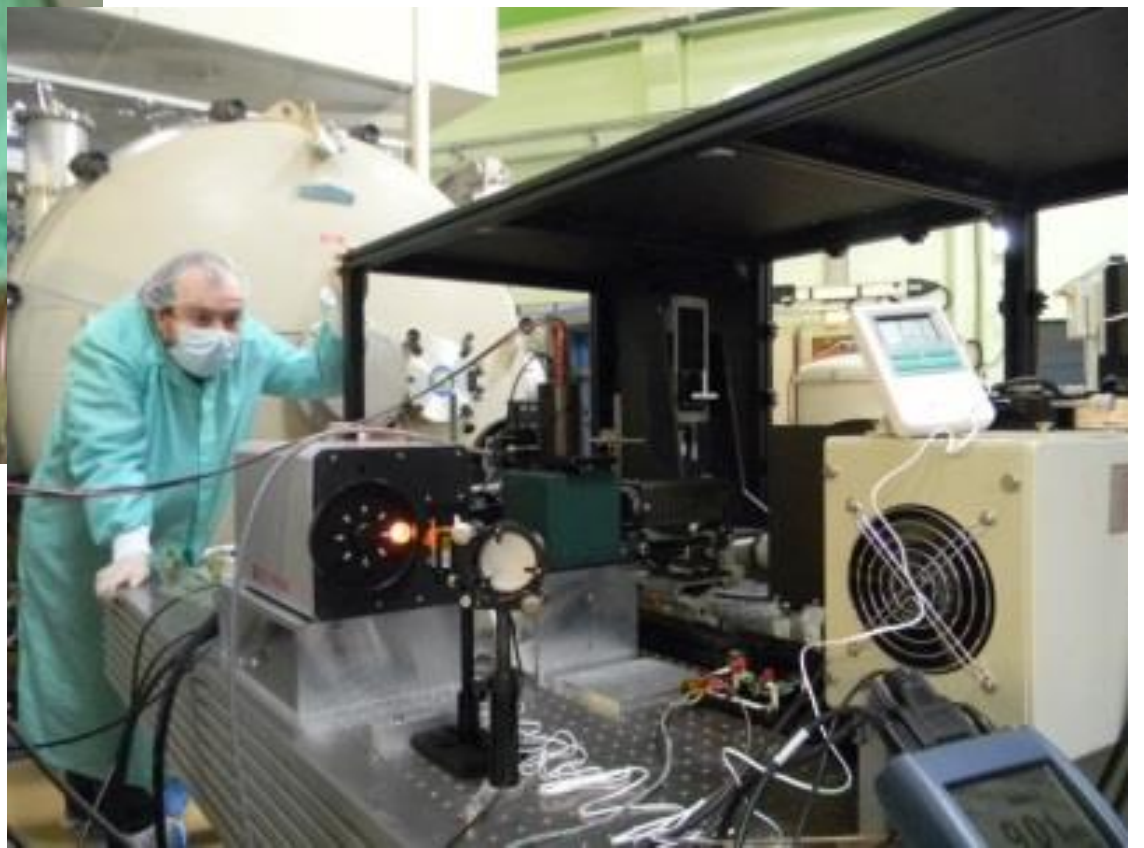
euclid


adidas


NASA


TR 35

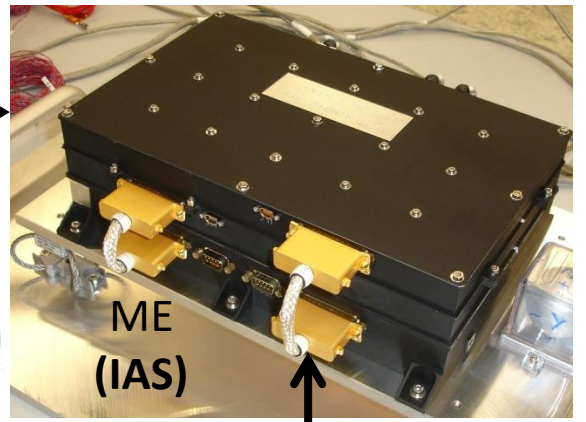


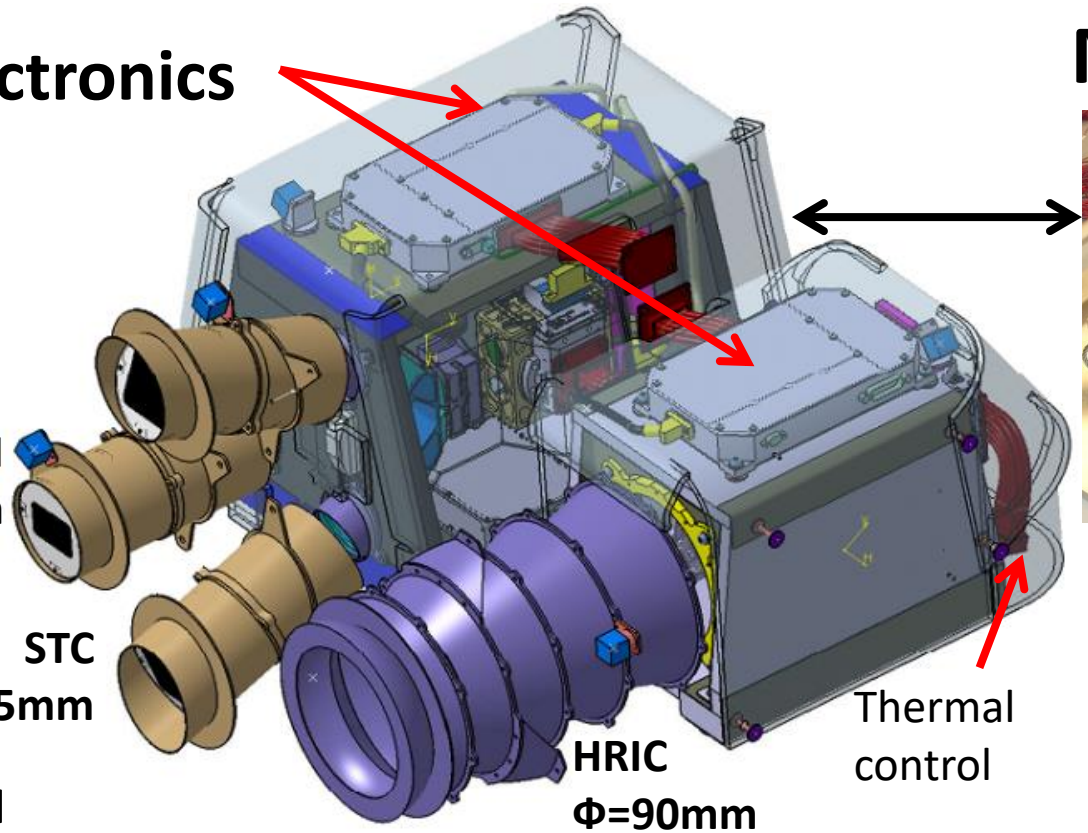


Spectrometers and Imagers for MPO BepiColombo Integrated Observatory SYStem

Channel electronics

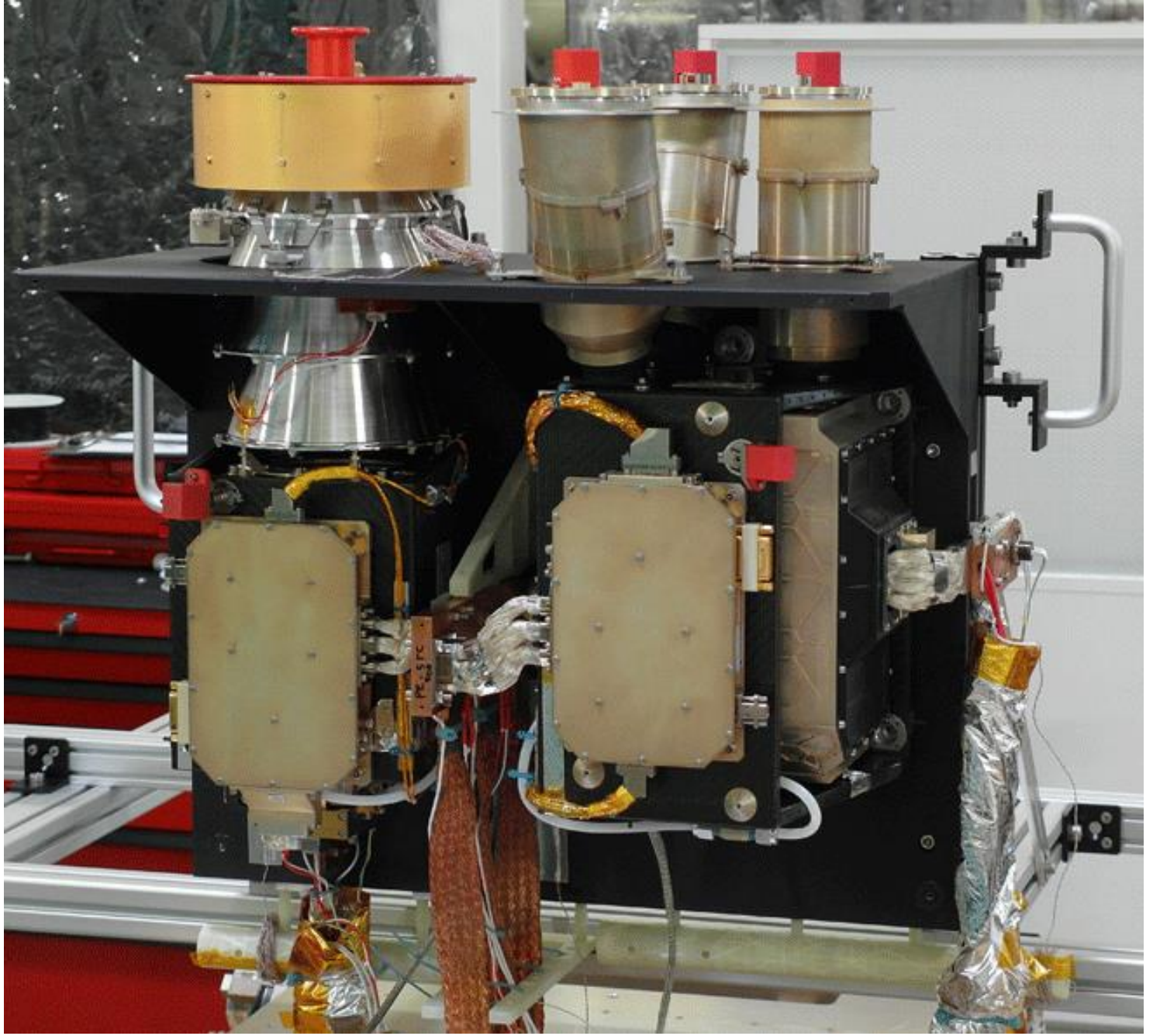
Main Electronics



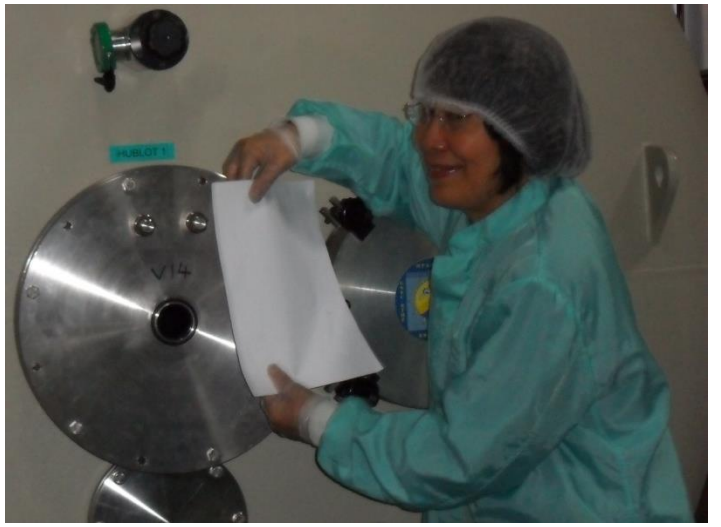


SC

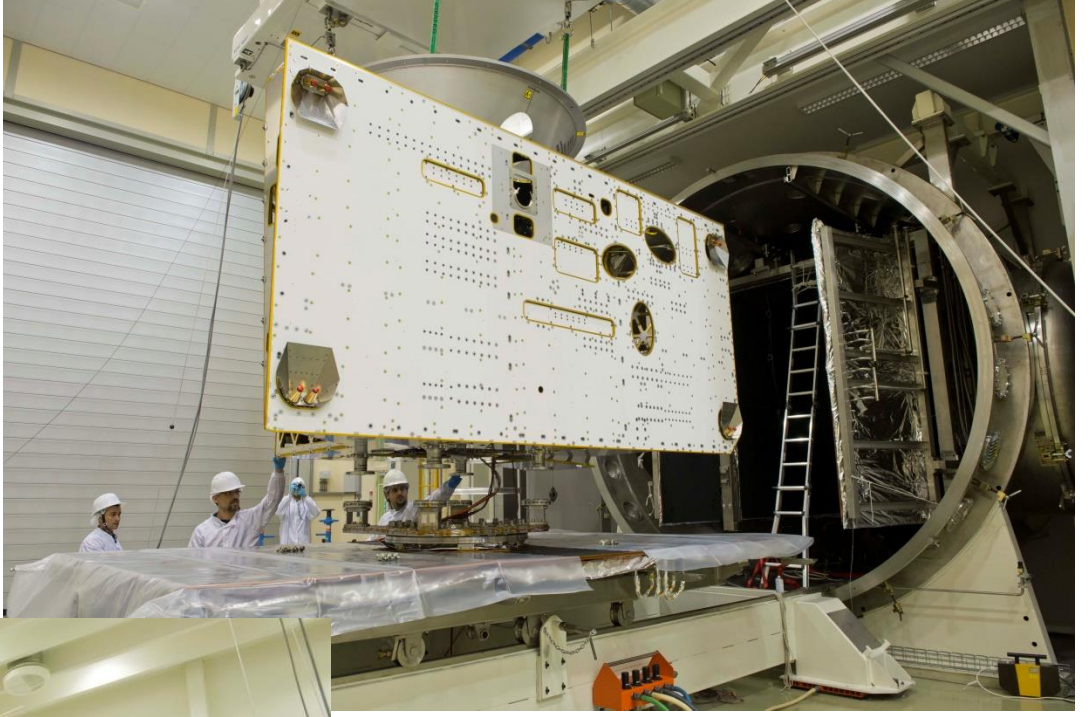
4 optical channels =
- VIHI
- HRIC
- STC (up)
- STC (down)

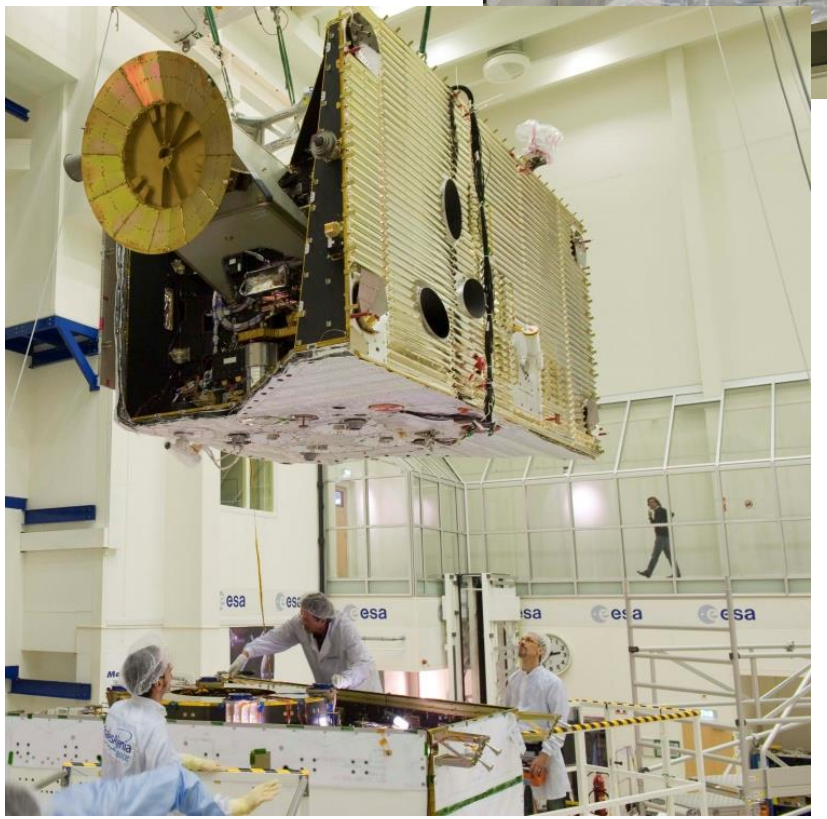


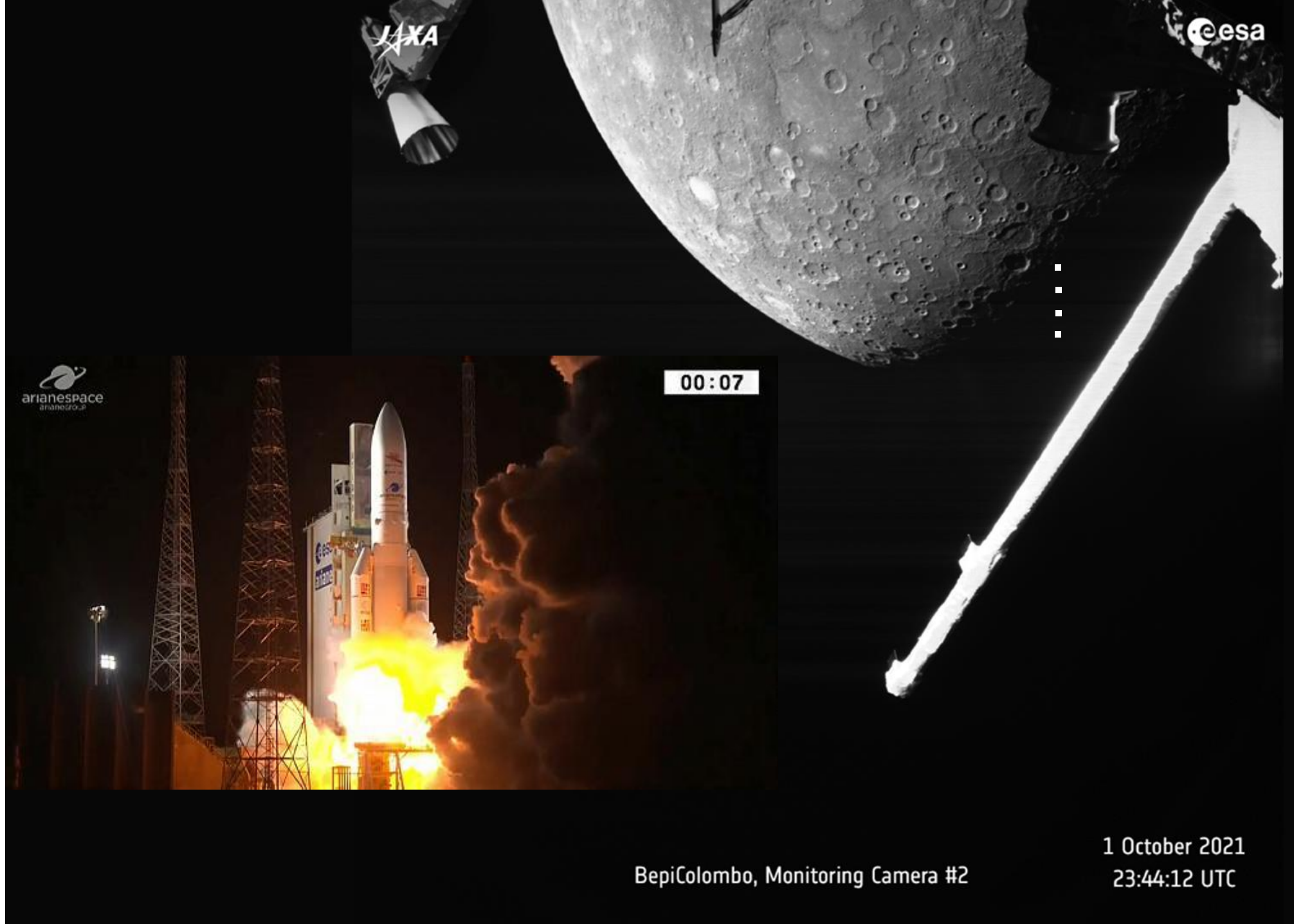
http://sci.esa.int/bepicolombo/

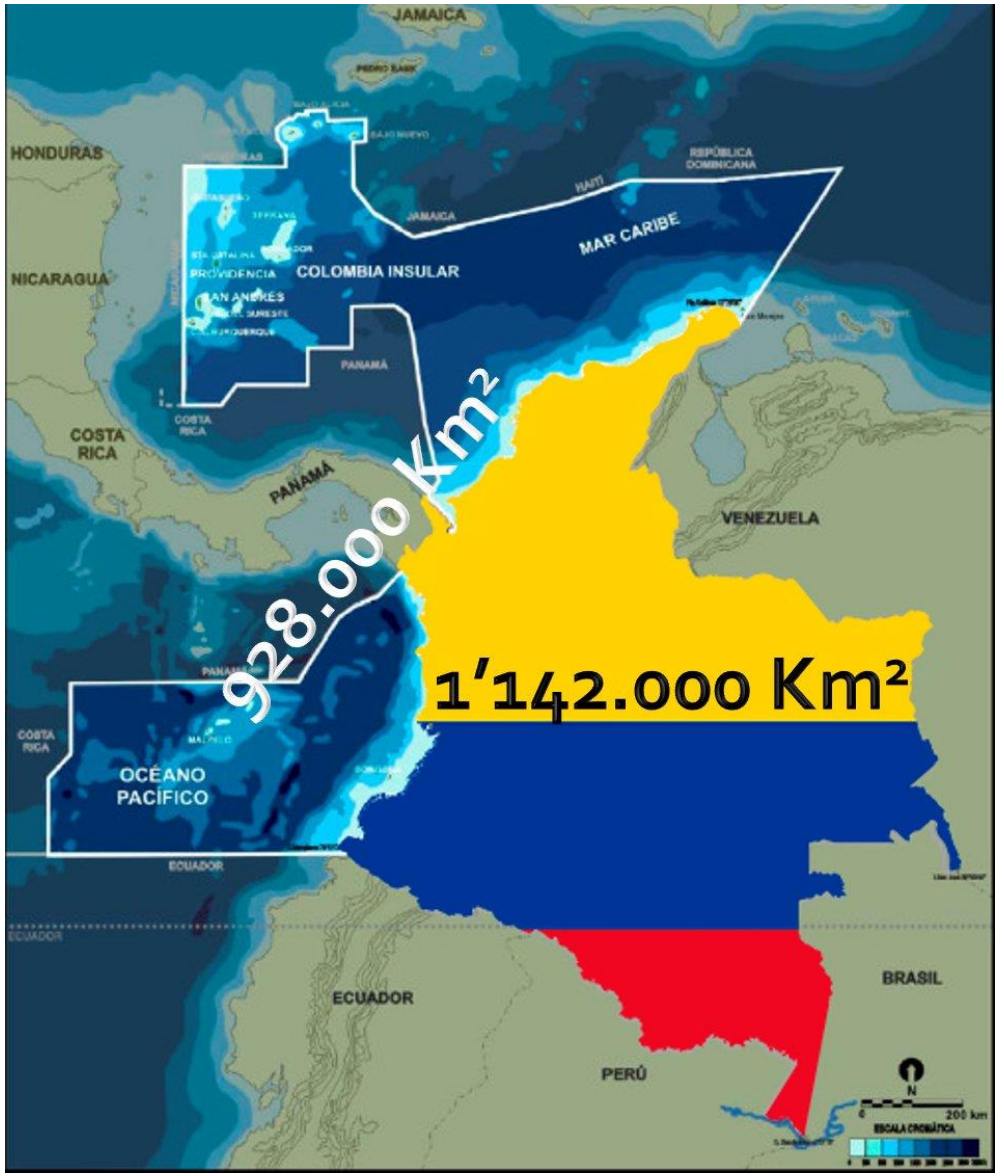



ANTENNA




esa


JAXA
esa
arianespace
00:07
BepiColombo, Monitoring Camera #2
1 October 2021
23:44:12 UTC

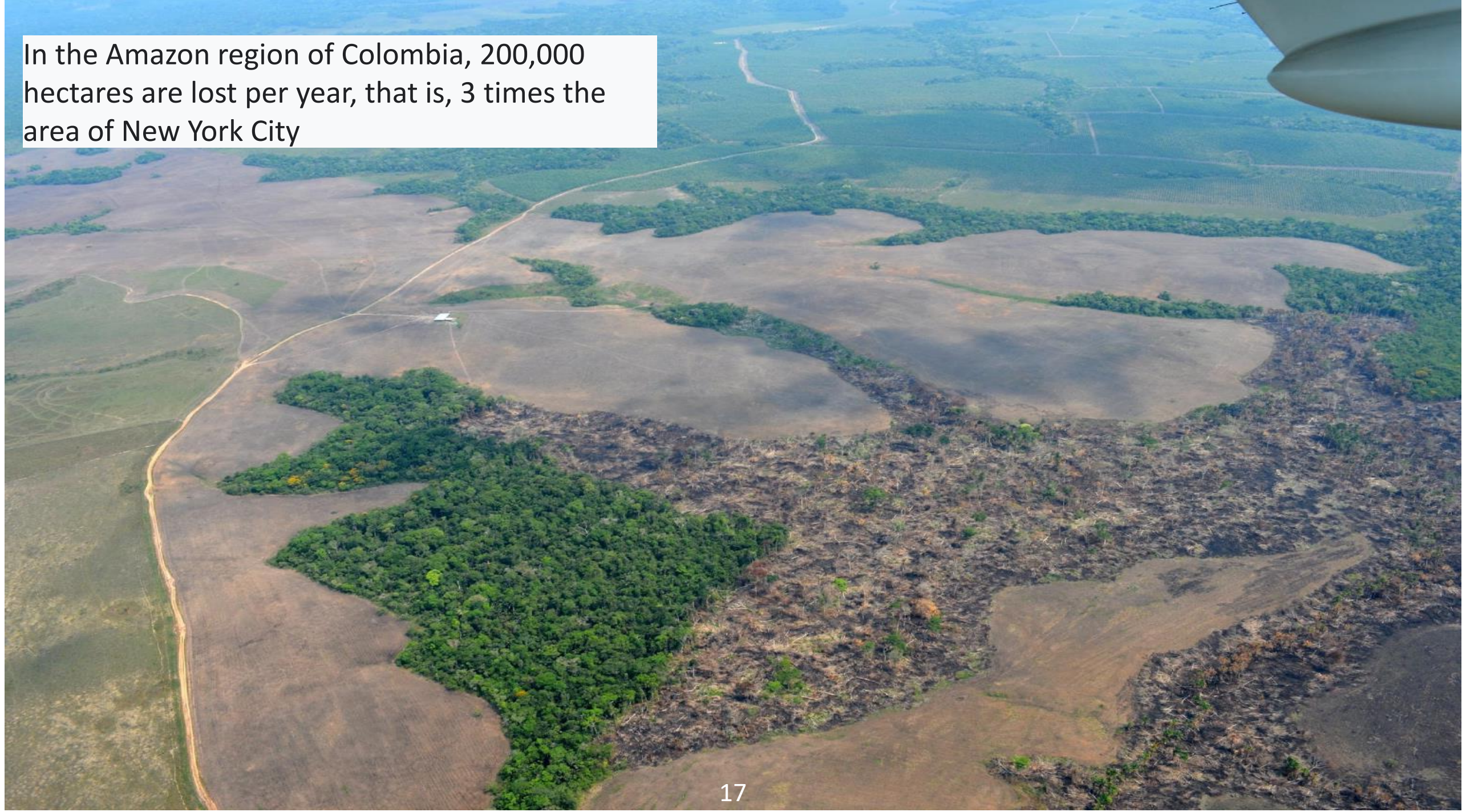

JAMAICA
HONDURAS
NICARAGUA
COSTA RICA
PANAMÁ
COLOMBIA INSULAR
PROVIDENCIA
SAN ANDRÉS
MAR CARIBE
HAITÍ
REPÚBLICA DOMINICANA
928.000 Km²
1'142.000 Km²
VENEZUELA
OCÉANO PACÍFICO
ECUADOR
PERÚ
BRASIL
N
200 km

Earth observation from space:

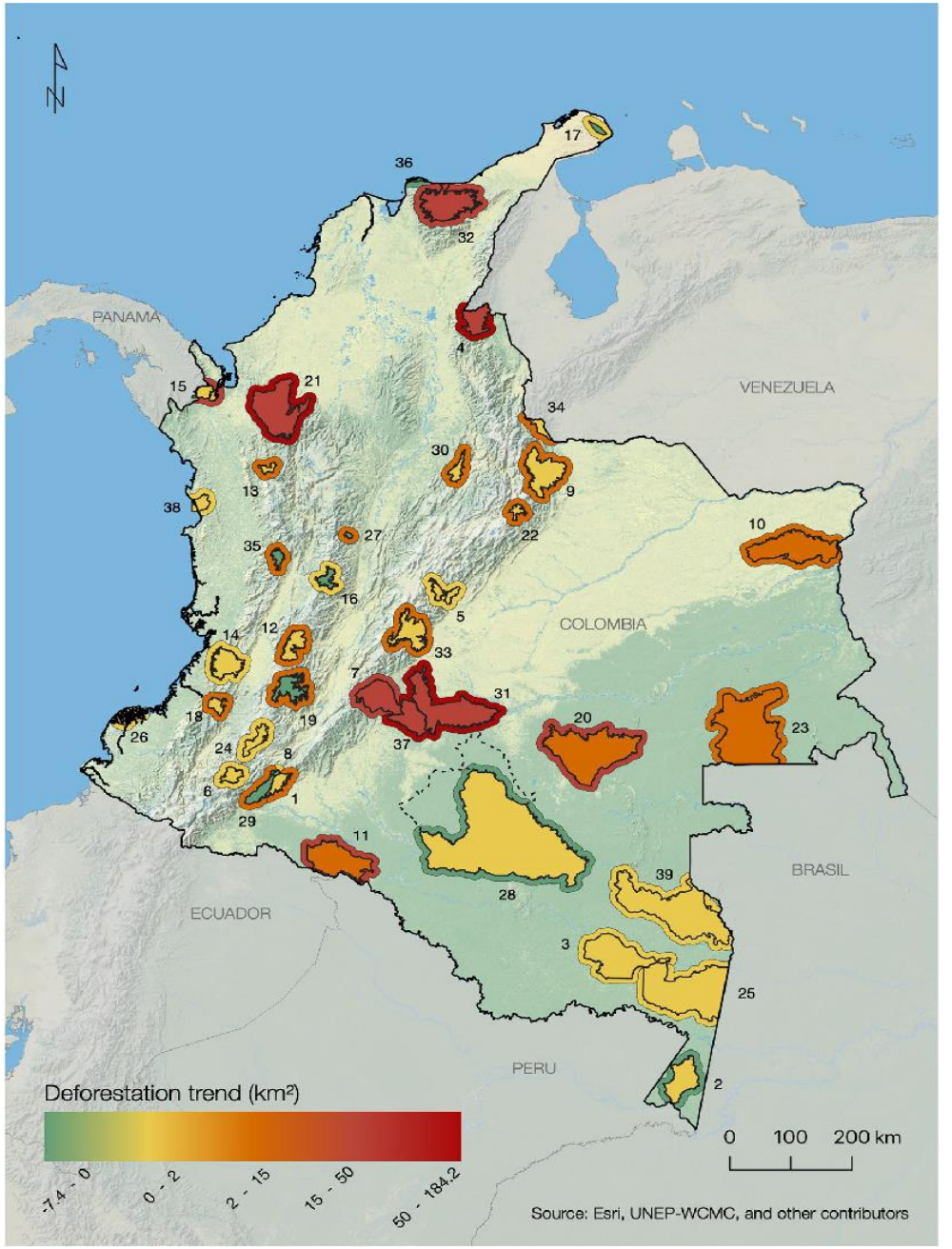
Study of the atmosphere

Bucaramanga !

Colombia has 638,000 km2 of forest… almost half of its surface


In the Amazon region of Colombia, 200,000 hectares are lost per year, that is, 3 times the area of New York City

Deforestation in national parks after peace agreements



SCUA

Semillero de Cohetería UIS Aeroespacial

Redes sociales:

@scuauis

https://scua.space

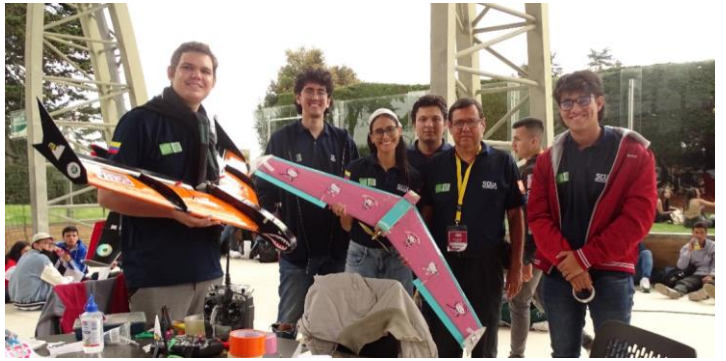
aeroespacial@uis.edu.co

Grupo de Investigación en Control, Electrónica, Modelado y Simulación CEMOS

Escuela de Ingenierías Eléctrica, Electrónica y de Telecomunicaciones
Universidad Industrial de Santander
e-mail: cemos@uis.edu.co

Grupo de Investigación en Energía y Medio Ambiente

Escuela de Ingeniería Mecánica
Universidad Industrial de Santander
e-mail: giema@uis.edu.co



Research

Education

Outreach

Education

- Students

Bs – Master & PhD

Members students:
Undergraduate: **40 …. 15 women**
Postgraduate: **7 in 2023**

Professors 5 (1 MSc, 4 PhD)

Direction:
Julián Rodríguez (Astrofísica-Aeroespacial)
Ricardo Jaimes (Ing. Mecánica)

At beginning in 2016

2017

2018


PINK

50
New members in 2022

Outreach

- Contest
- Schools
- Activities on campus

Outreach at schools and universities In Bucaramanga

National Contest

International competitions

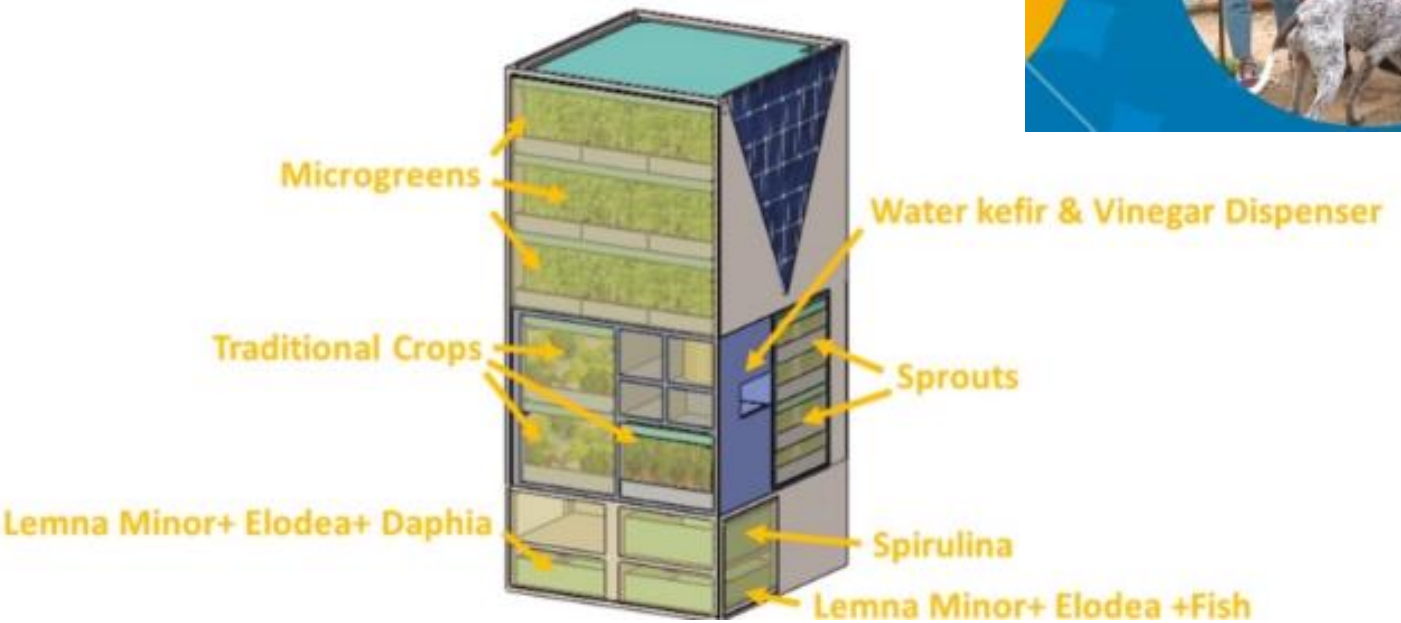
International contest

17 Nov 2021 - 4:17 p. m.

Estudiantes de la UIS ganaron concurso de la NASA clave para misiones espaciales

Se trata de un concurso de la NASA dedicado a la producción de alimentos para misiones espaciales de larga duración.

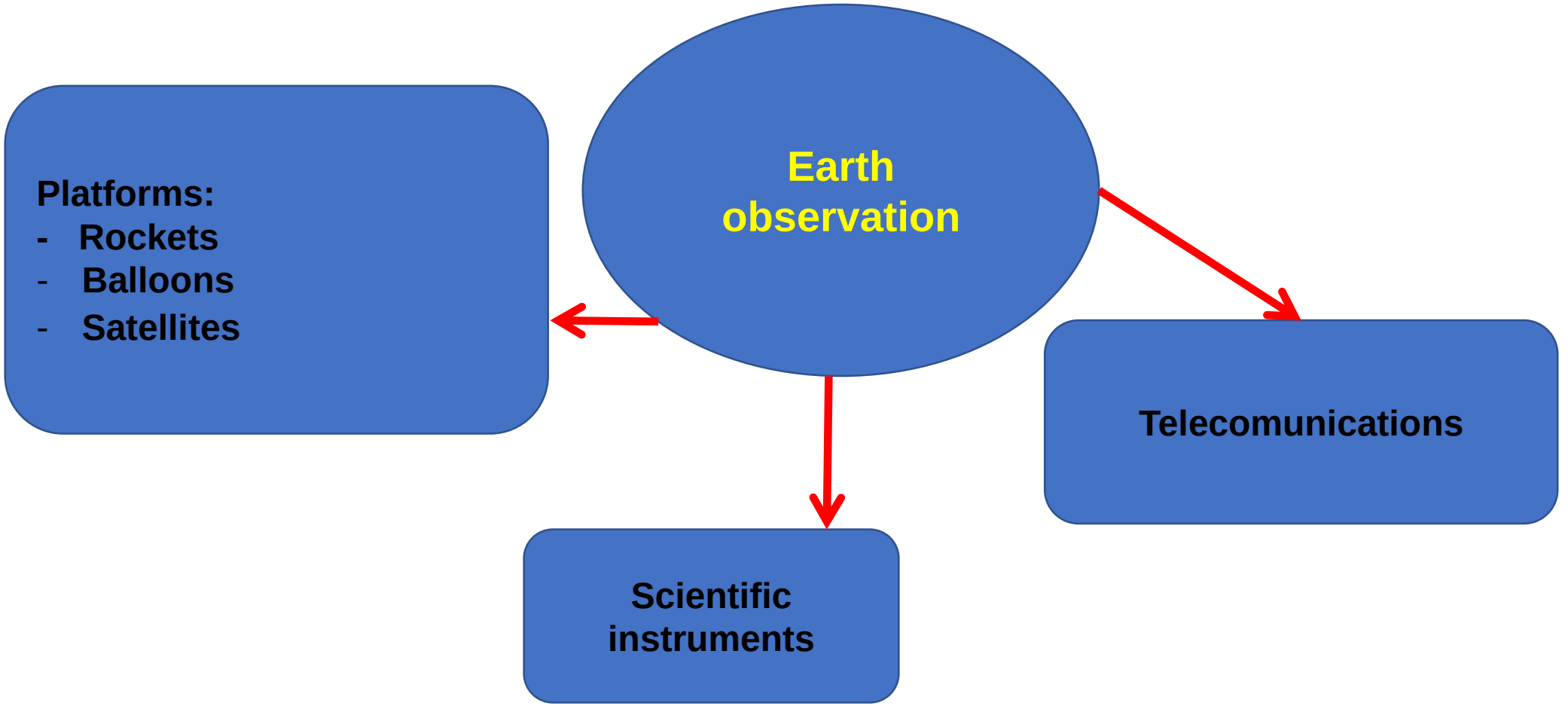
Redacción Colombia



Research

- Ballooning
- Drones
- CanSat
- High power rocketry
- Satellites
- Human exploration

Research lines

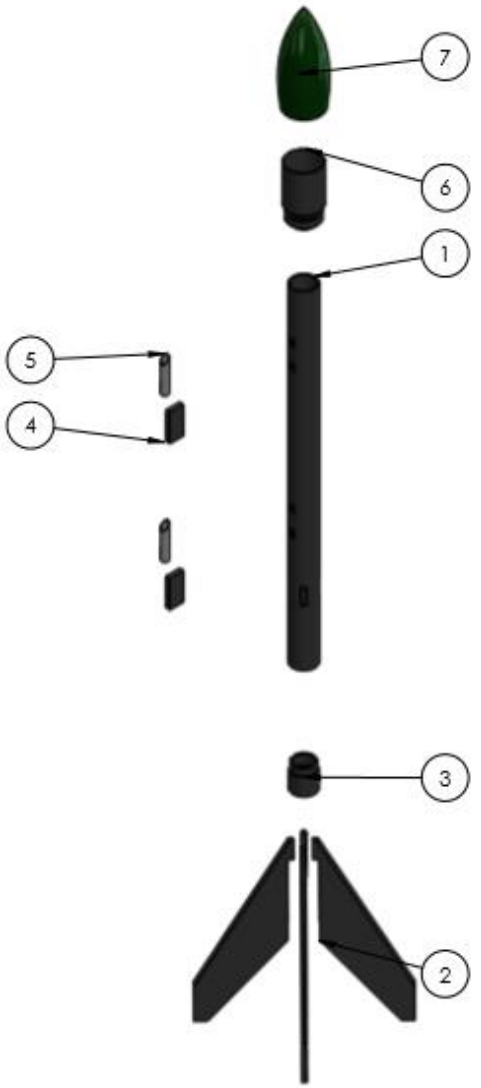


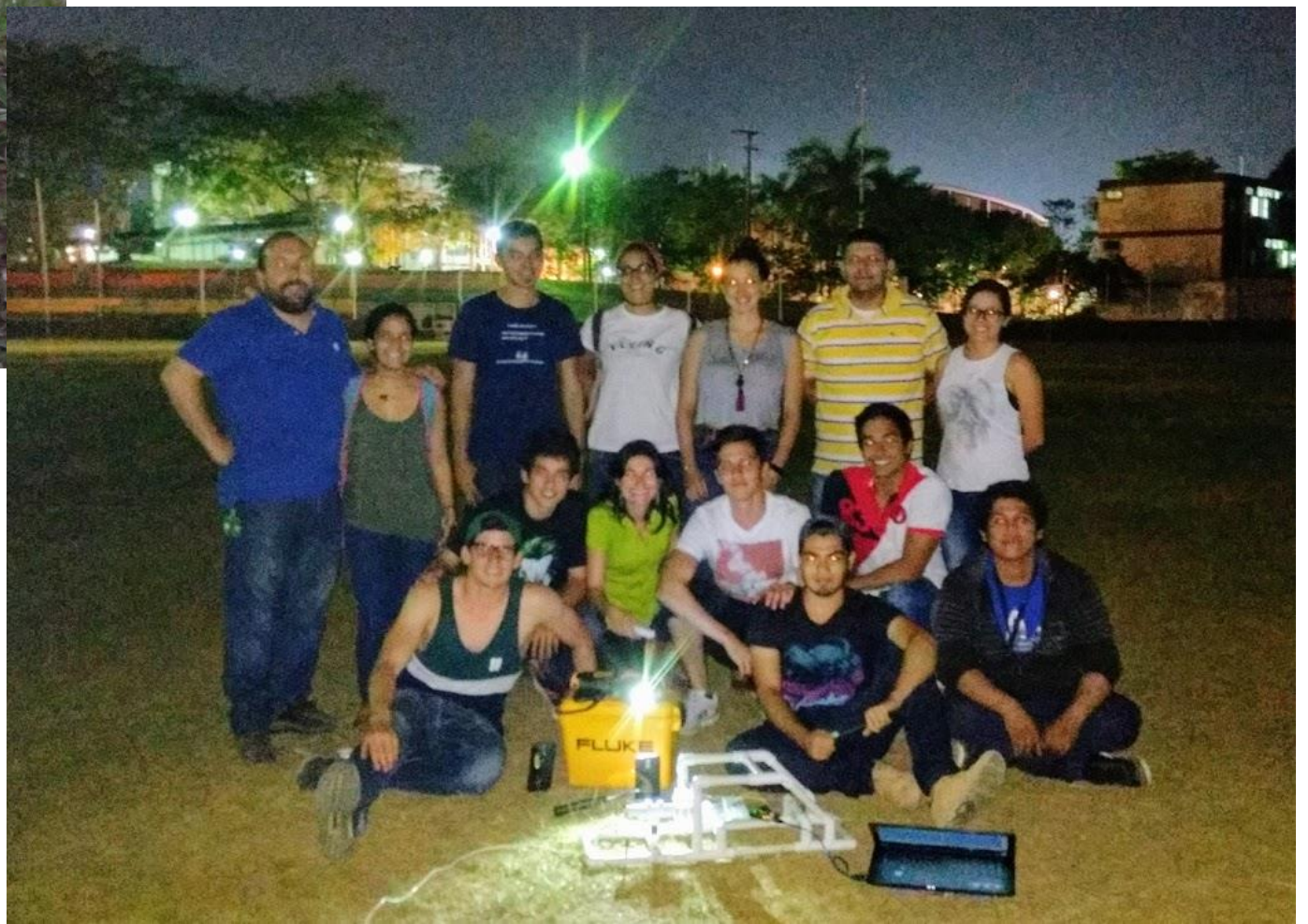
Rocketry

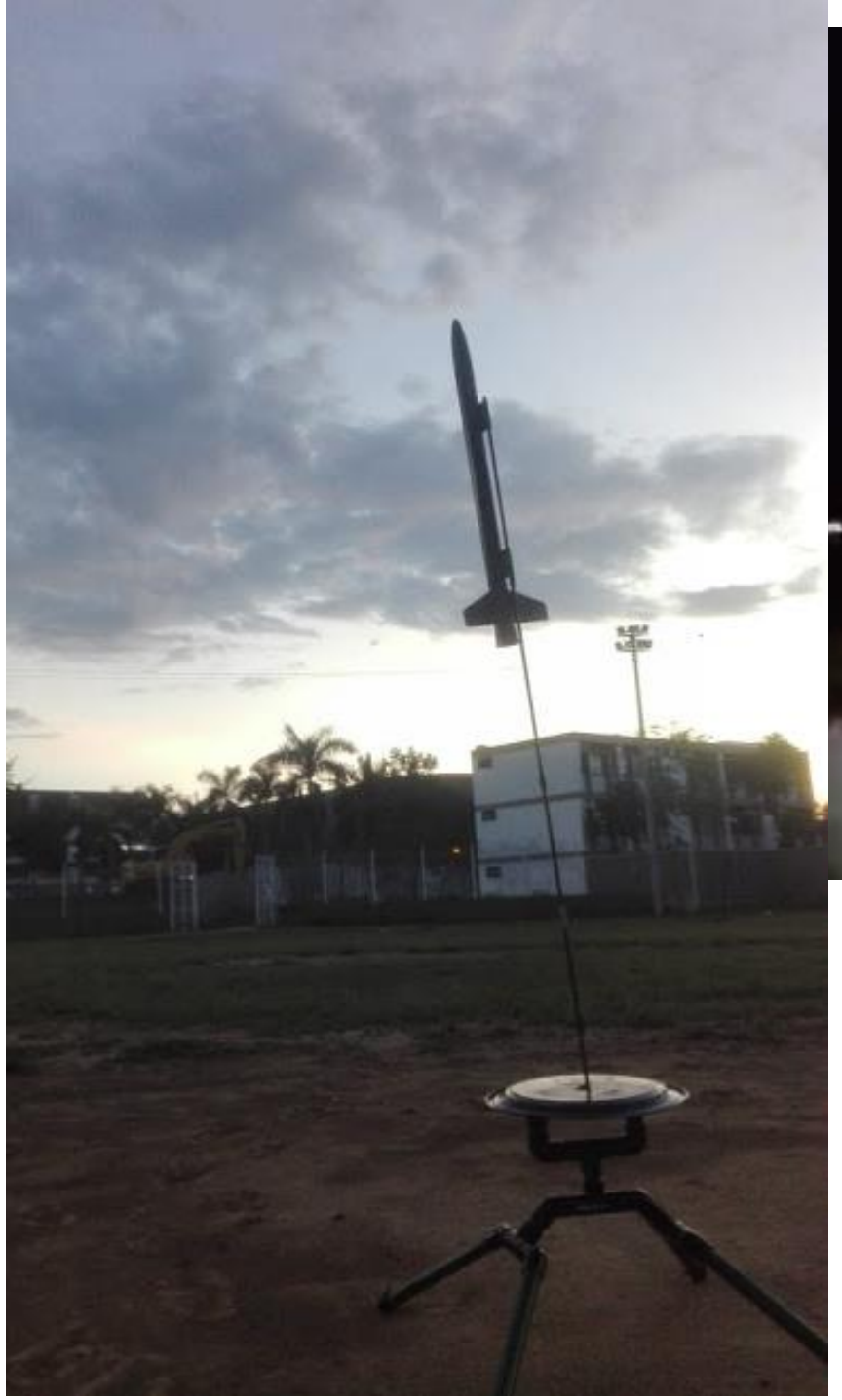
Hickam

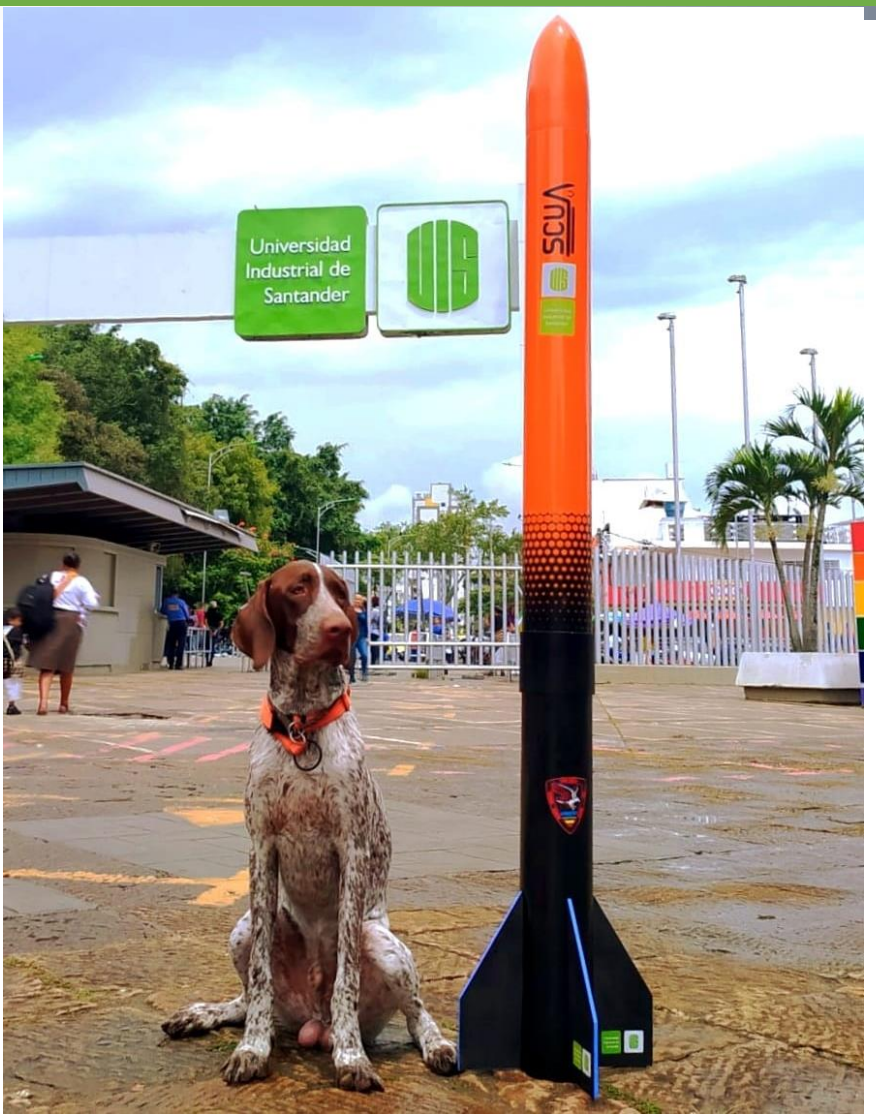
300m

R-Candy




FLUKE





ROCKET CHALLENGE

Orión-UIS


SCUA
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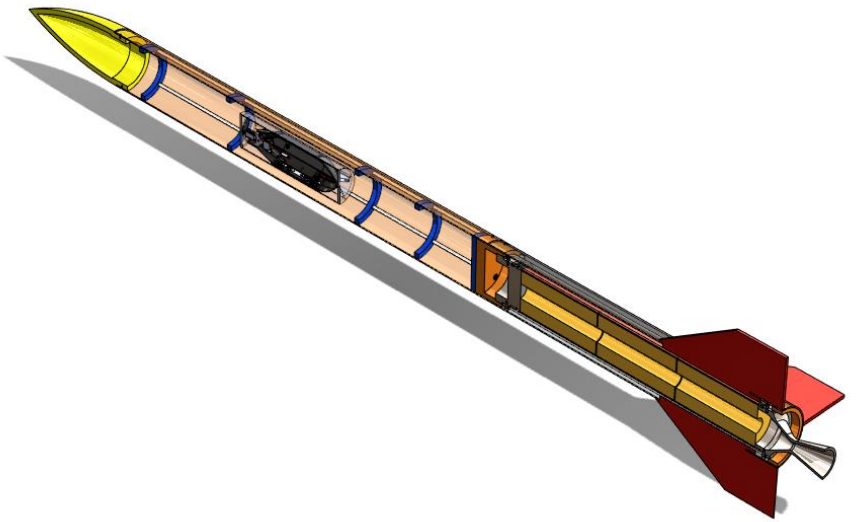
The design of the structure is based on the DFMA (Design for Manufacturing and Assembly) methodology, it is a design focused on additive manufacturing and modularity.

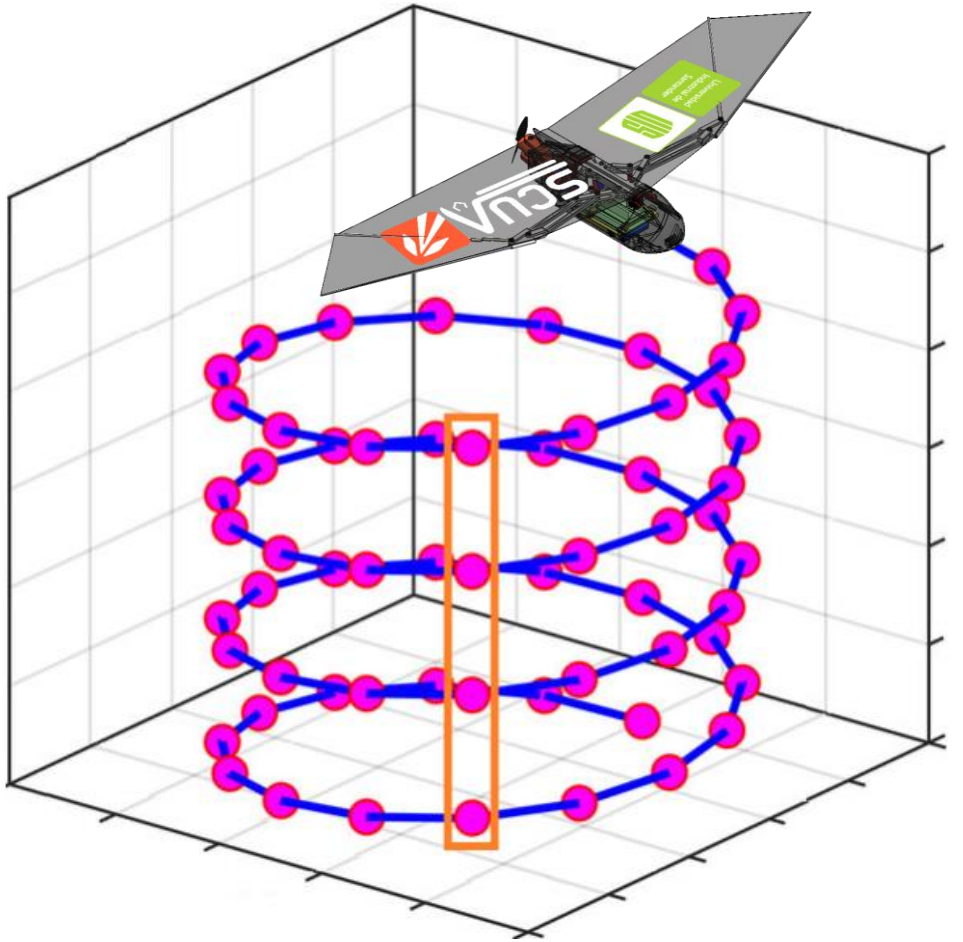


SATELLITE CHALLENGE: CanSat

A CanSat is a scale satellite which rises inside a rocket with a mission, ours is to carry out a controlled descent in a spiral while data is taken to build profiles of atmospheric variables and thus determine contamination levels in the flight area. Data and recorded video are sent to the ground station in real time

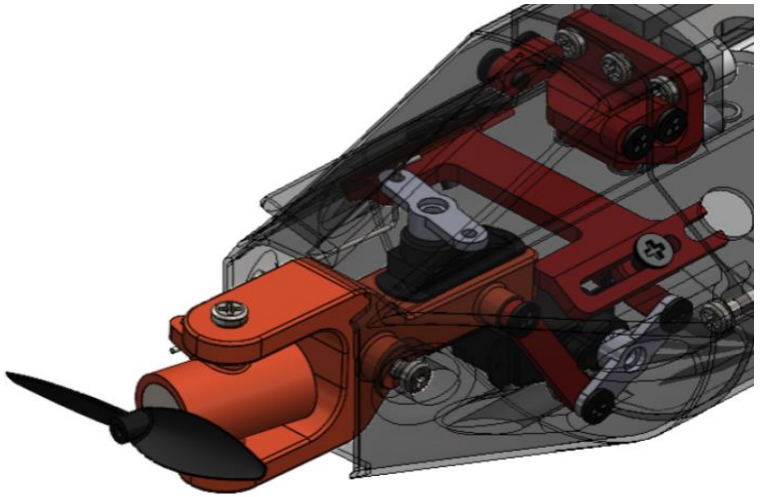
ATMOSPHERIC DATA

- carbon dioxide CO2
- carbon monoxide CO
- Nitrogen dioxide NO2
- Ammonia NH3
- Volatile Organic Compounds
- Temperature Humidity
- Barometric pressure



SATELLITE CHALLENGE

Structurally, the CanSat has a pair of folding wings, which allows it to easily go inside the rocket. When it is ejected from the rocket at a height of 500m, with the help of a vector thrust propeller, flight control is carried out to follow the desired trajectory in a controlled spiral descent with the orientation of the sensors.



Scientific ballooning

Mission concept

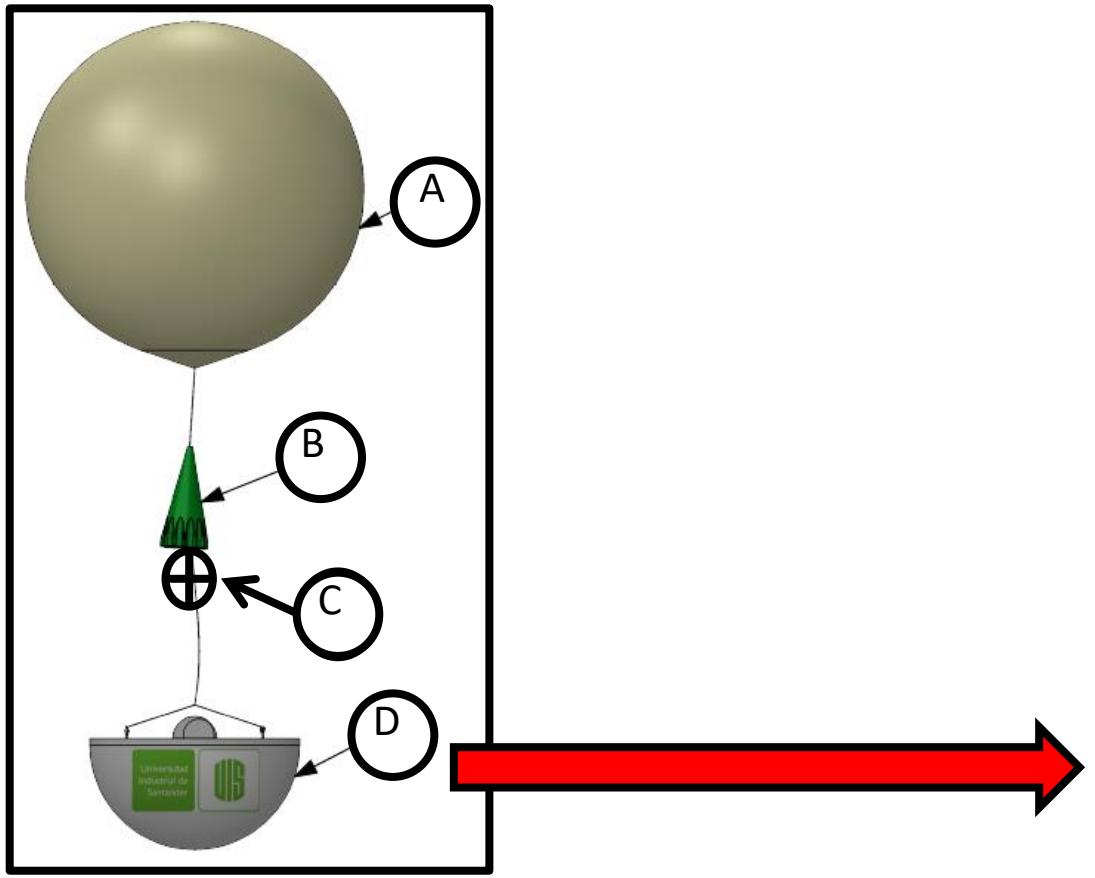


Figure 1. General view of the probe balloon.

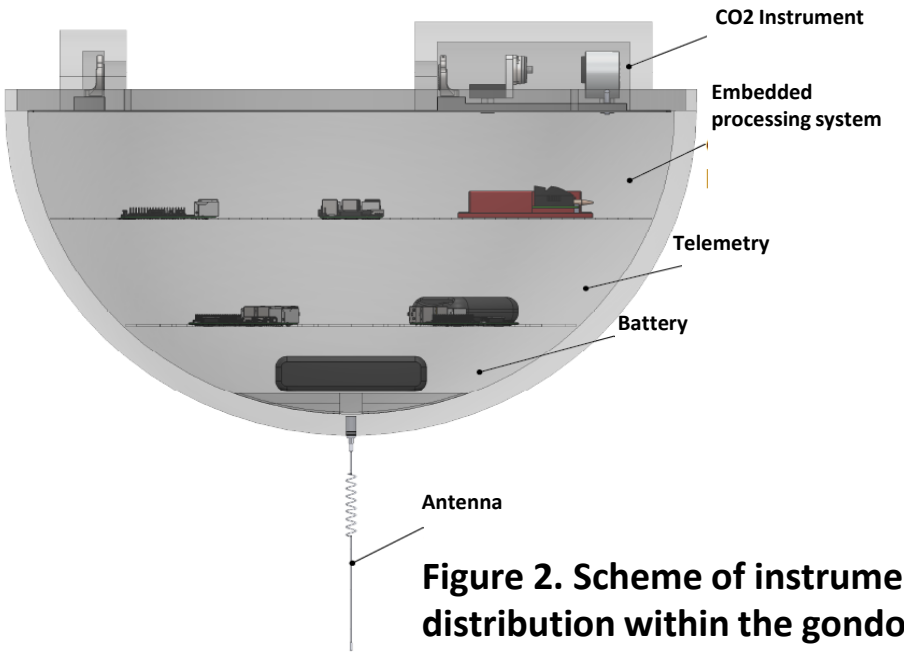
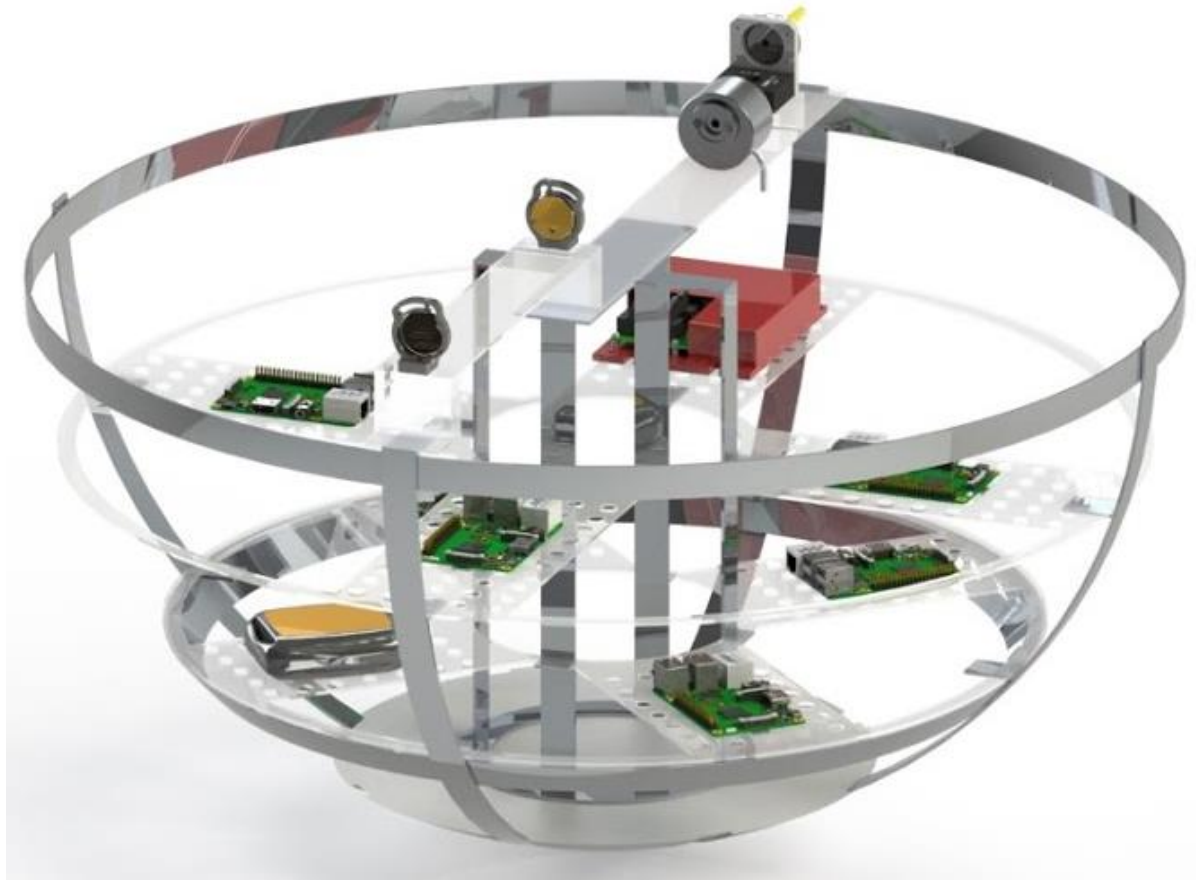
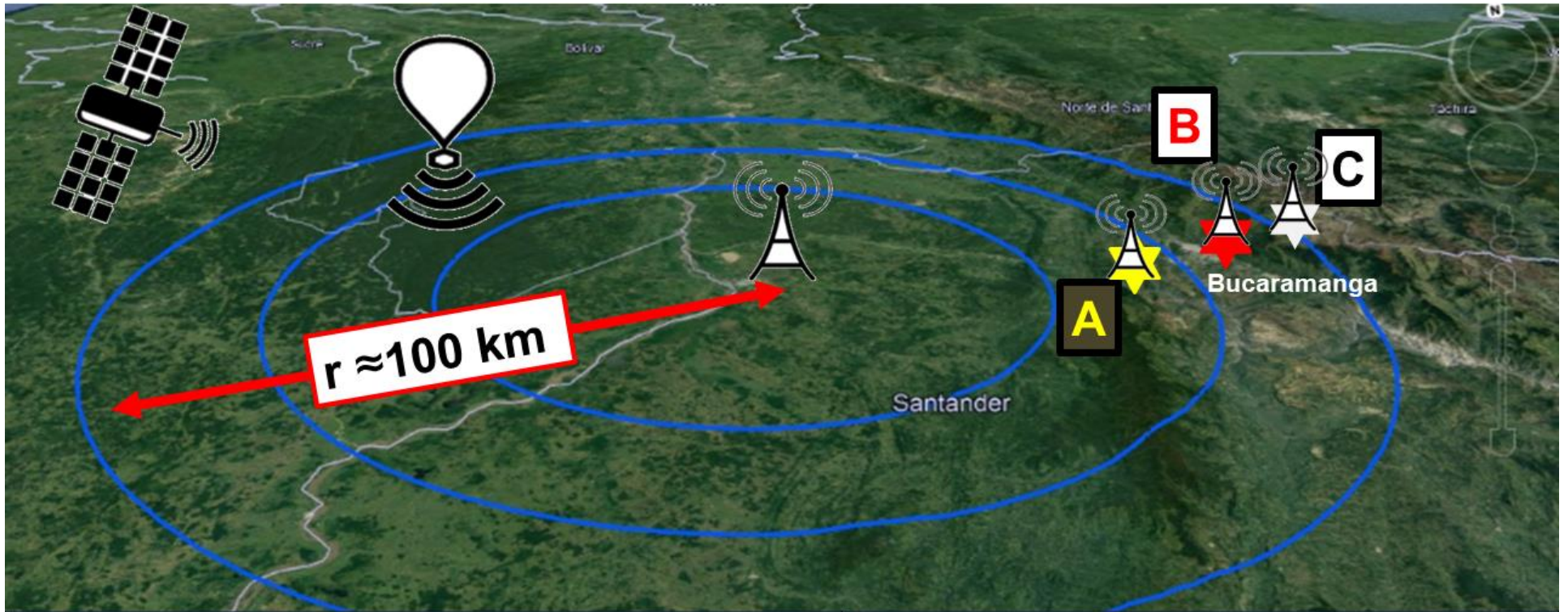


Figure 2. Scheme of instrumentation distribution within the gondola.




GIEMA
GEMOS
RADIOGIS
Universidad
Industrial de
Santander

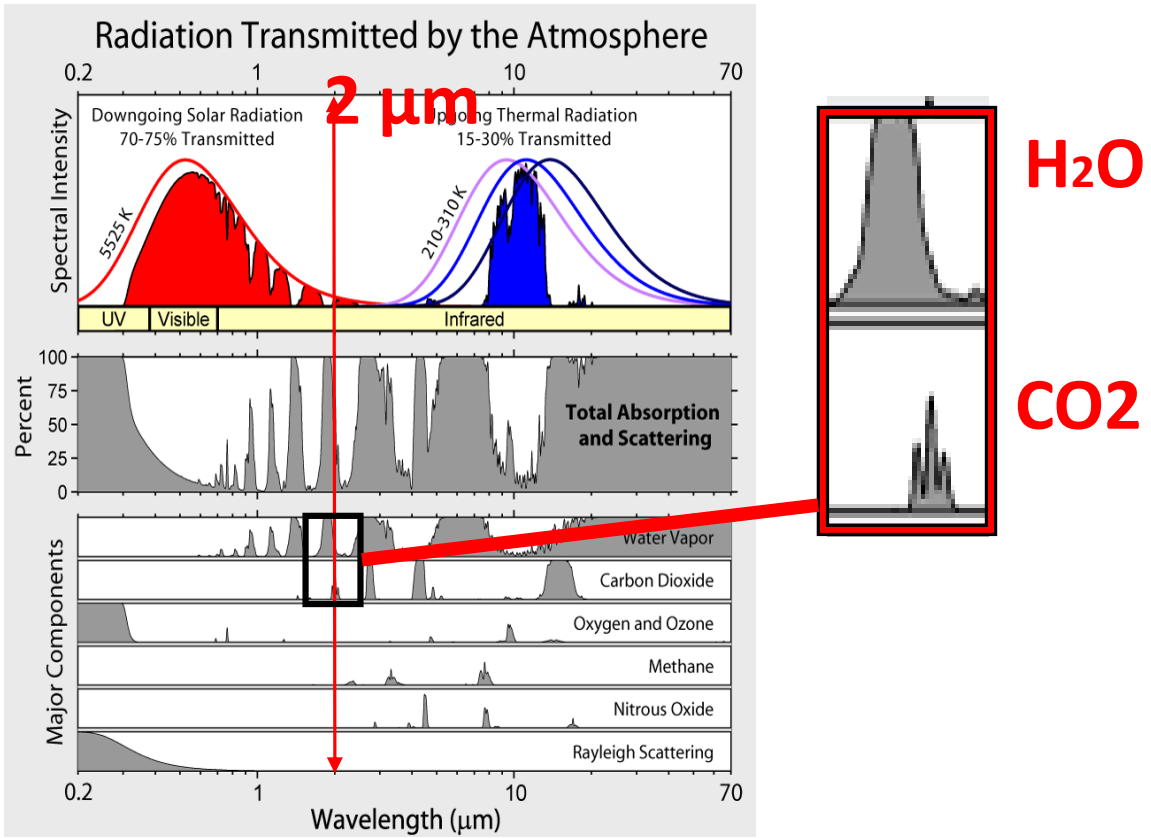


Ground Base Station: BARRANCABERMEJA	Linear Distance to Barrancabermeja
BETULIA Repeater Station A	66,50 km
ALTO DE LOS PADRES Repeater Station B	86,00 km
PICACHO Repeater Station C	98,30 km

CONCENTRATION of CO_2

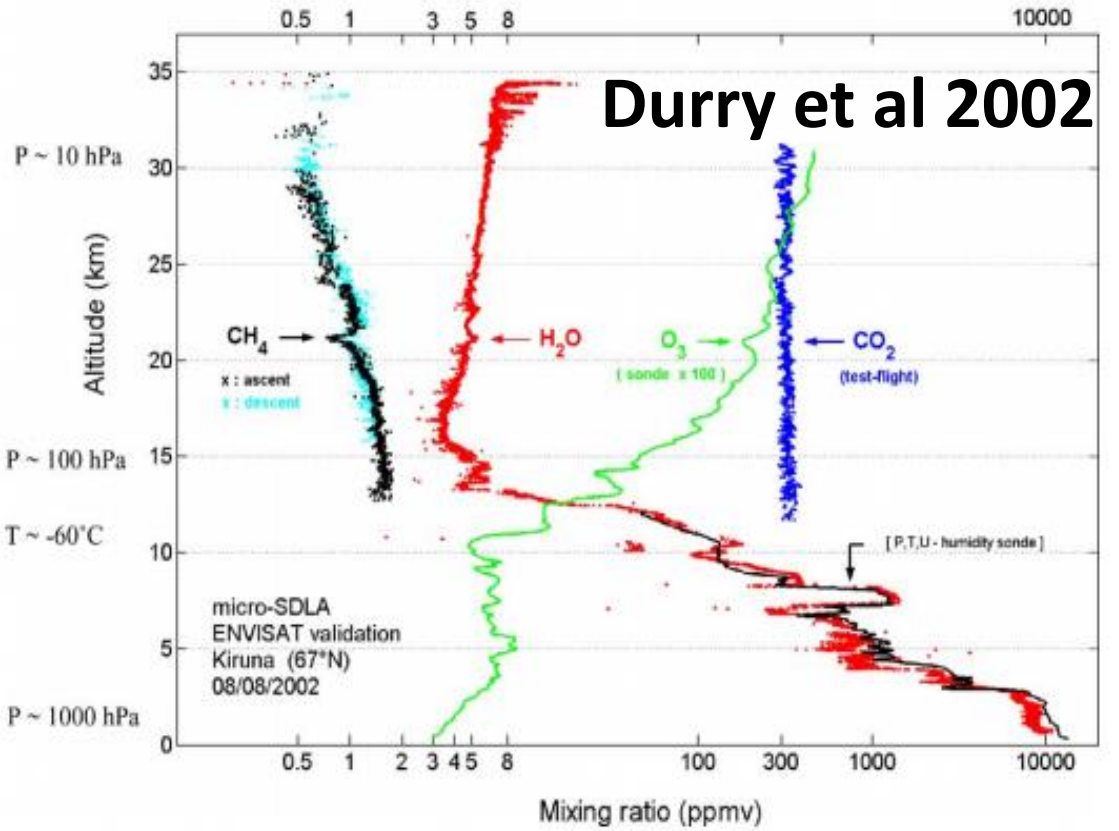
Instrumentation system capable of measuring atmospheric CO2 concentration using the technique:

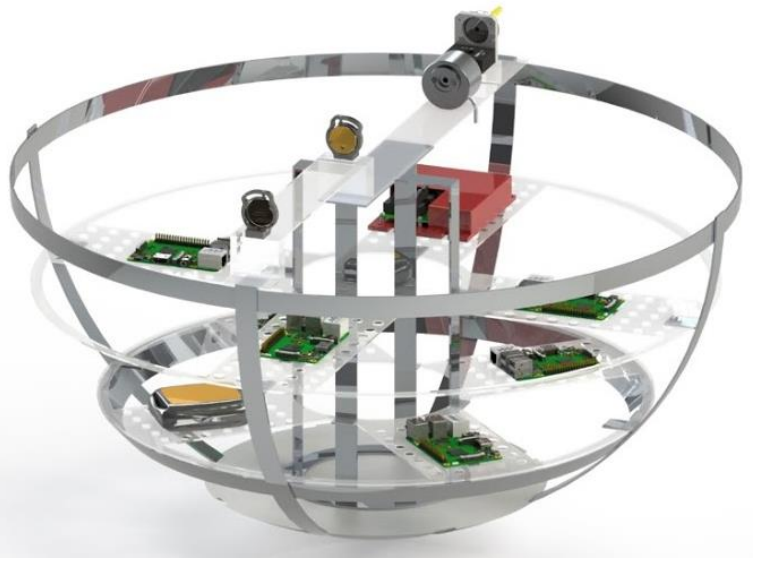
Tunable Diode Laser Absorption Spectroscopy (TDLAS)



H_2O

CO2





Jueves, 27 de septiembre de 2018

Contáctenos Visítenos Búsqueda Directorio Mapa d

UIS Unidades Académicas Programas Académicos Investigación y Extensión Profesores Estudiantes Gestión Adm

> noticia.jsp?id=9918&canal=canalComunicaciones

UIS Y FAC UNEN LAZOS PARA DESARROLLAR CIENCIA Y TECNOLOGÍA AEROESPACIAL

Publicado: Lunes, 24 de Septiembre de 2018

Teleuis

La Universidad Industrial de Santander y la Fuerza Aérea Colombiana (FAC) acordaron hoy unir esfuerzos para aprovechar fortalezas de a ejecutar proyectos aeroespaciales y nanosatelitales conjuntos que beneficien la agroindustria, las comunicaciones y el medio ambiente.

Para tal fin, directivos de estas instituciones se reunieron en la UIS y proyectaron iniciativas sobre el sector espacial y temáticas afines. Asim programa **FACSAT** que actualmente adelanta la Fuerza Aérea Colombiana.

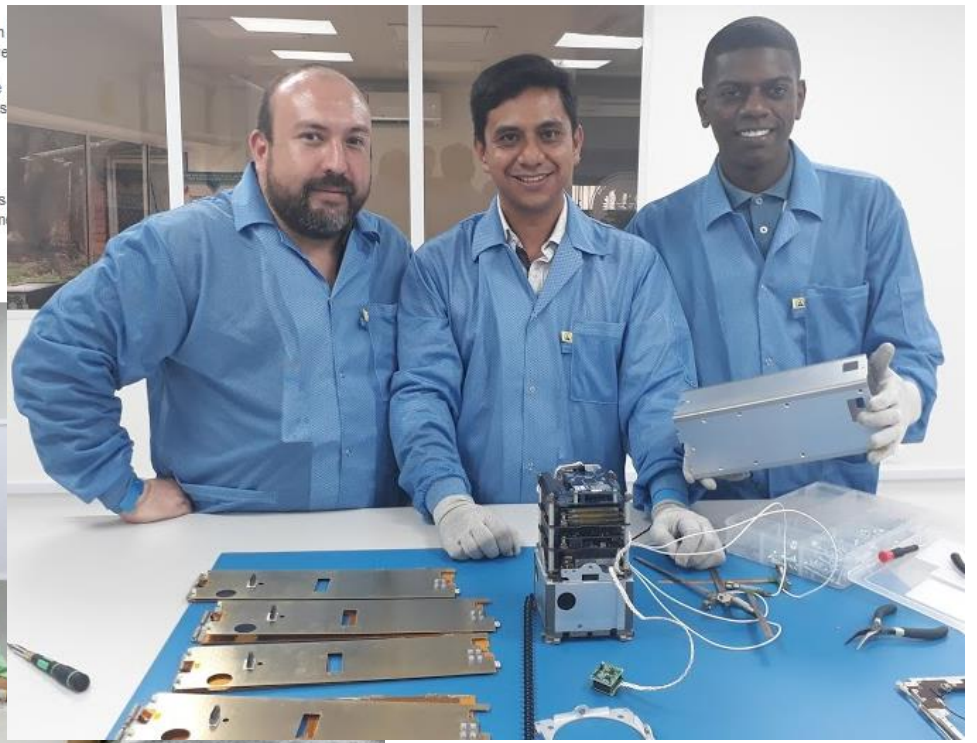
La reunión fue presidida por el coronel de la FAC, Carlos Giovanni Corredor; el vicerrector académico, Gonzalo Alberto Patiño Benavide Investigación y Extensión, Guillermo Alfonso González Villegas; los profesores de las escuelas de Física, Luis Alberto Nuñez; de Diseño Ind Bautista y de Ingeniería Electrónica, Julián Rodríguez Ferreira.

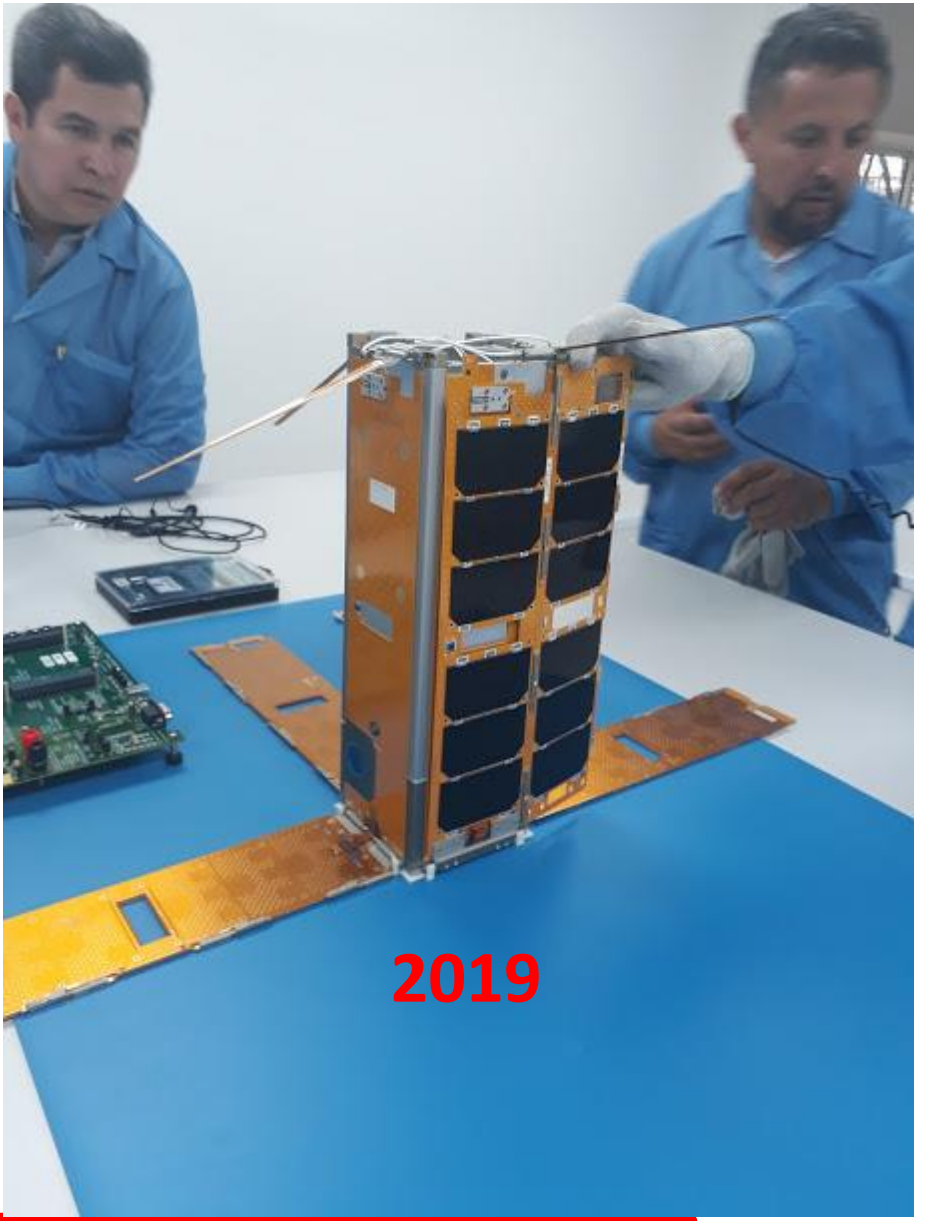
"La Fuerza Aérea hace acercamientos con la academia en general y en esta ocasión con el sector espacial en el País, no solamente con aplicación militar, sino para fomentar la inve

El profesor de la Escuela de Física, Luis Alberto Núñez, se refirió a la importancia de proyectos muy concretos de nanosatélites que tengan incidencia sobre la agroindus atmosféricas y de suelo que le interesen a la agroindustria regional".

¿Qué es el FACSAT?

FACSAT, es un programa que involucra varios proyectos basados en el desarrollo de las espacio. Su función permite mostrar la aplicabilidad que tienen el día a día a través de la m





UIS Y FAC UNEN LAZOS PARA DESARROLLAR CIENCIA Y TECNOLOGÍA AEROESPACIAL

Universidad Industrial de Santander

FUERZA AÉREA COLOMBIANA

SIC ITUR AD ASTRA

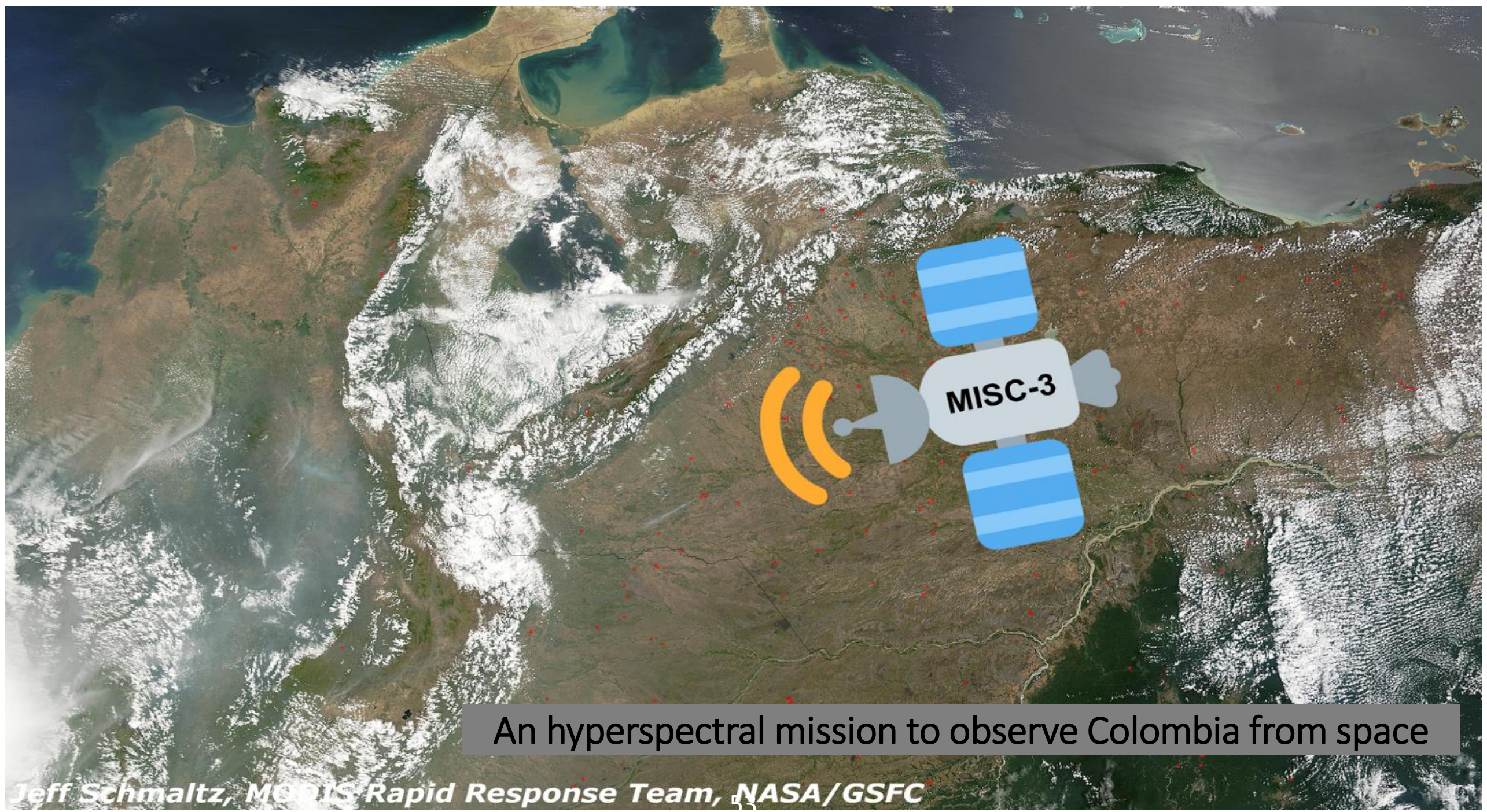
ASÍ SE VA A LAS ALTURAS

CITAE

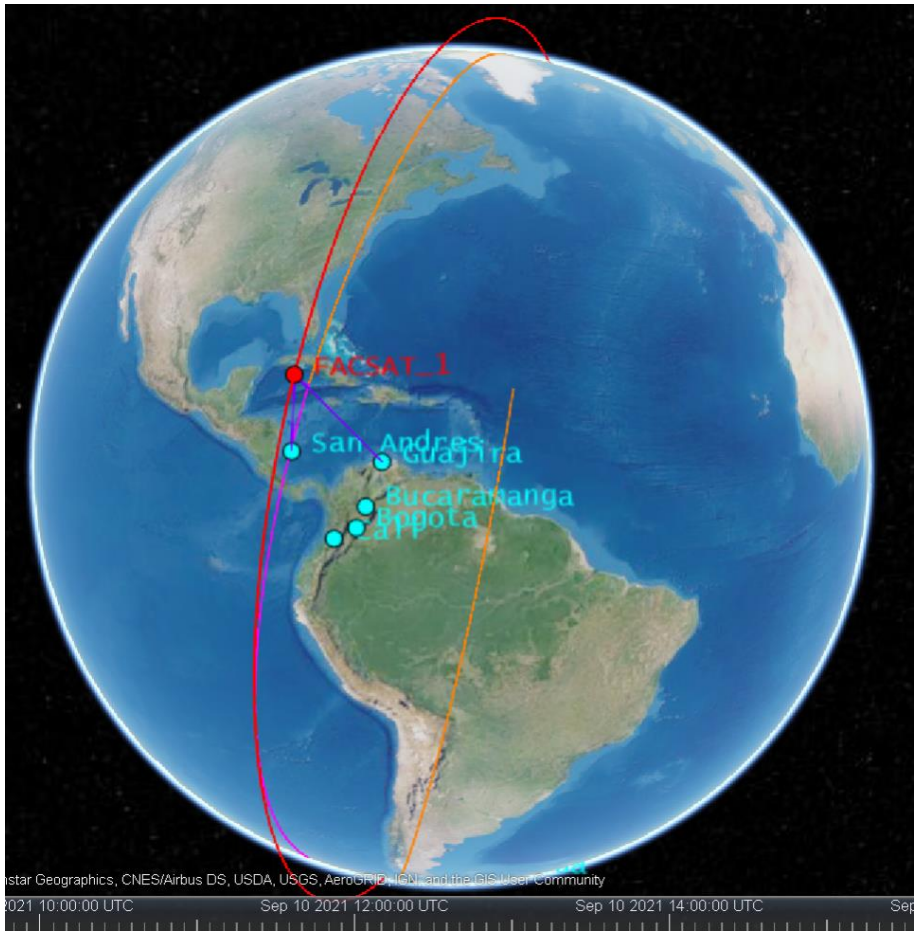
Universidad del Valle

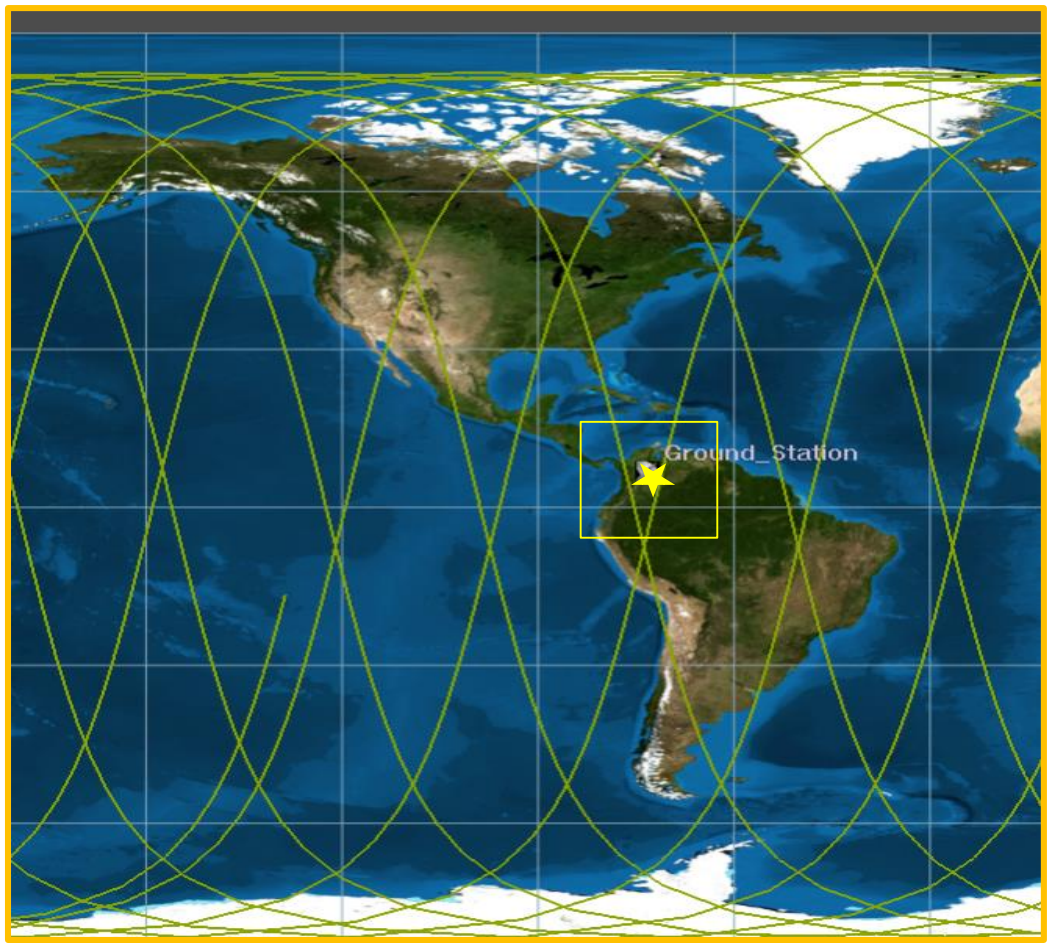
UNIVERSIDAD SERGIO ARBOLEDA

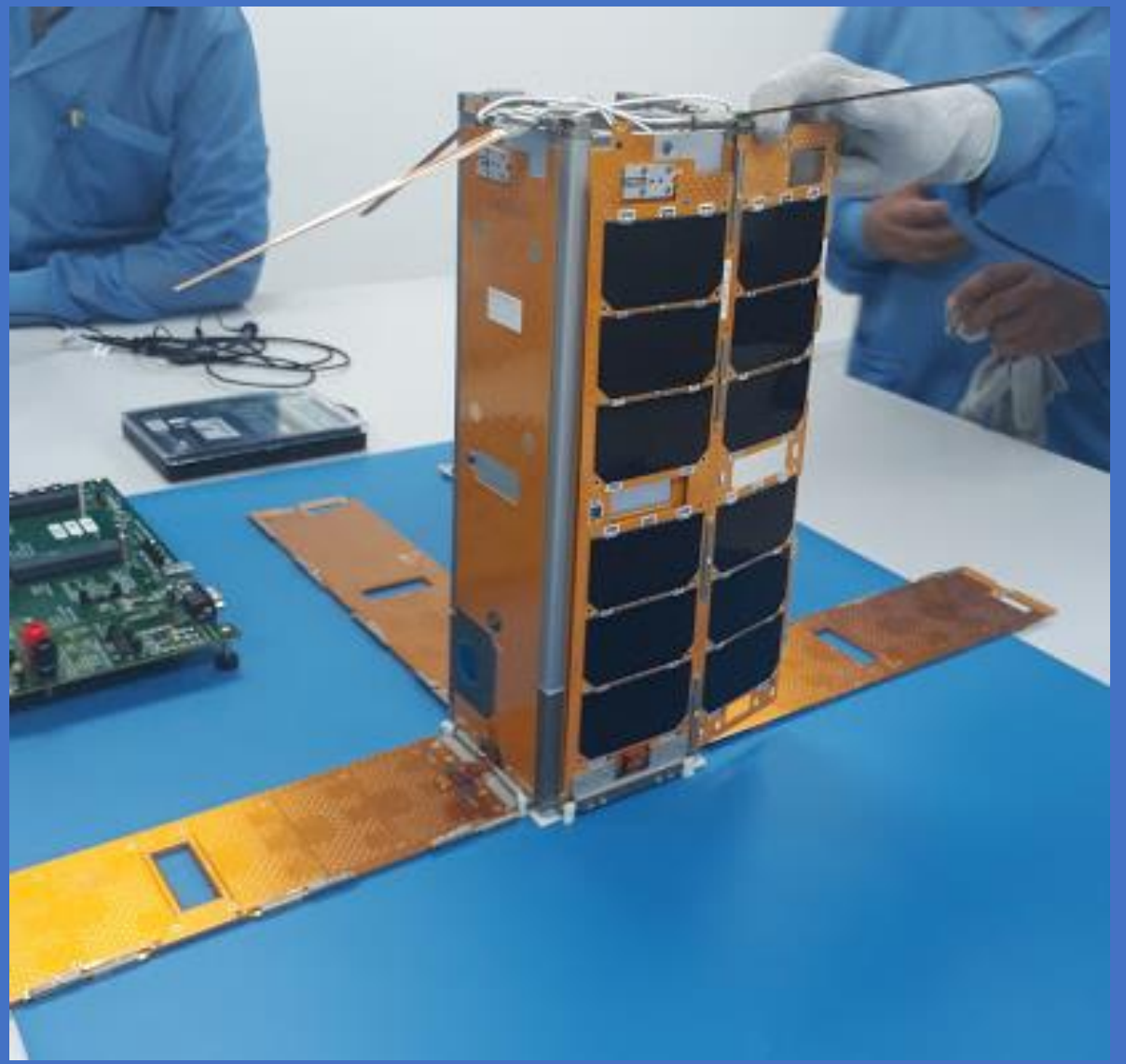
Founding: Research ministry MINCIENCIAS


MISC-3
An hyperspectral mission to observe Colombia from space
Jeff Schmaltz, MODIS Rapid Response Team, NASA/GSFC

Sun-synchronous orbit with 2 passes/day over Colombia







- MISC3 CubeSat-class Payload Carrier Nanosatellite Assembly from Pumpkin Space Systems.

- MISC 3 combines Commercial off-the-shelf hardware and software with purpose-built hardware and an Hyperspectral Camera as payload

Payload

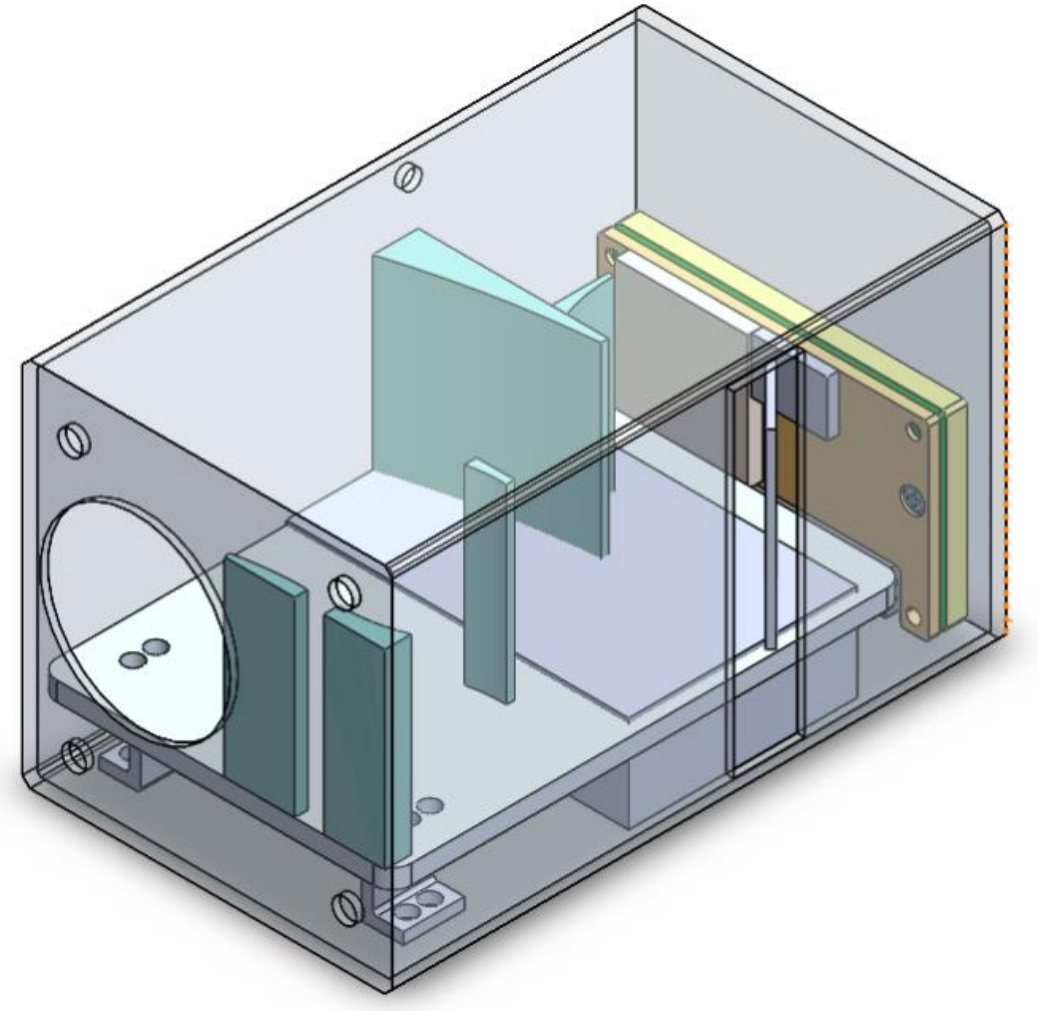
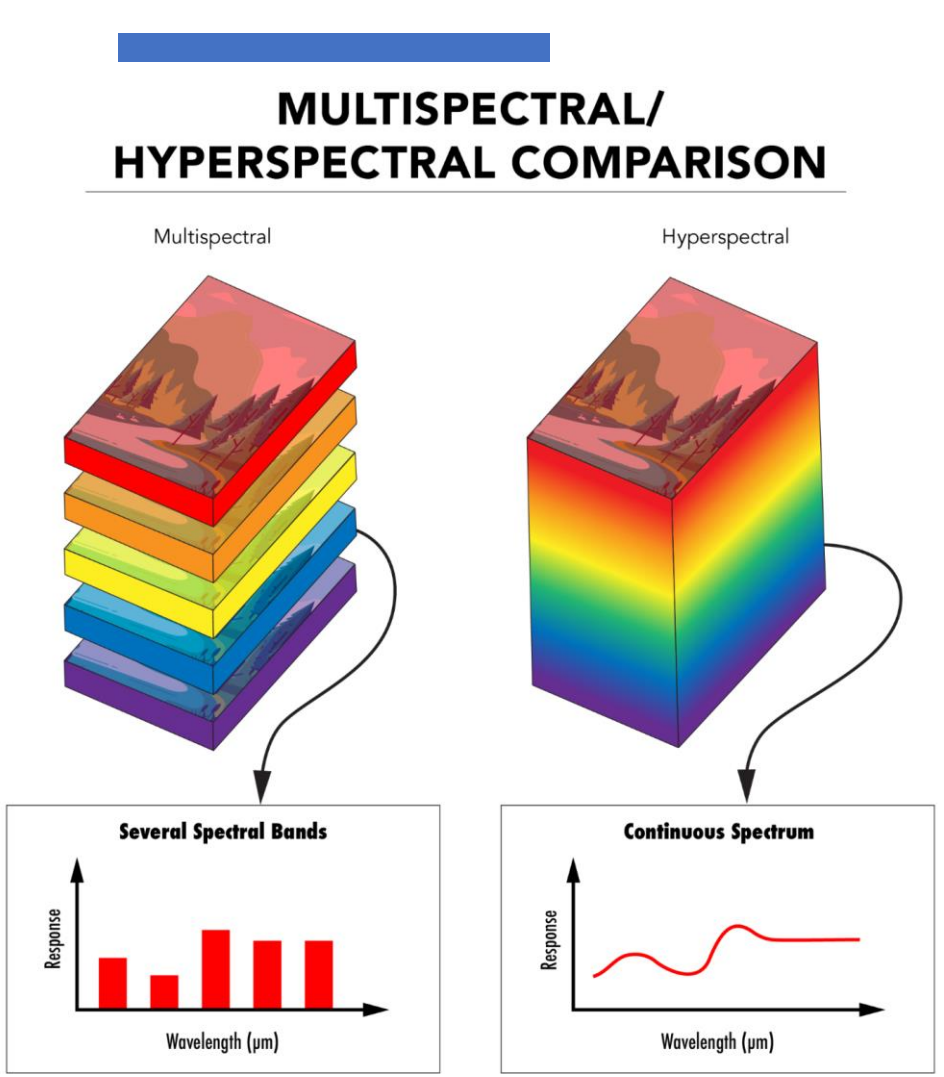
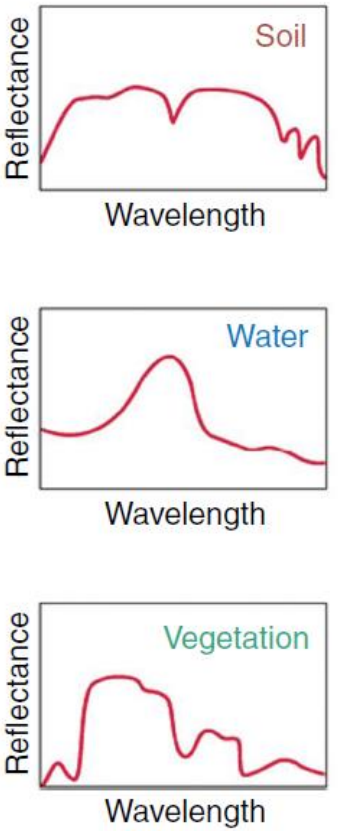
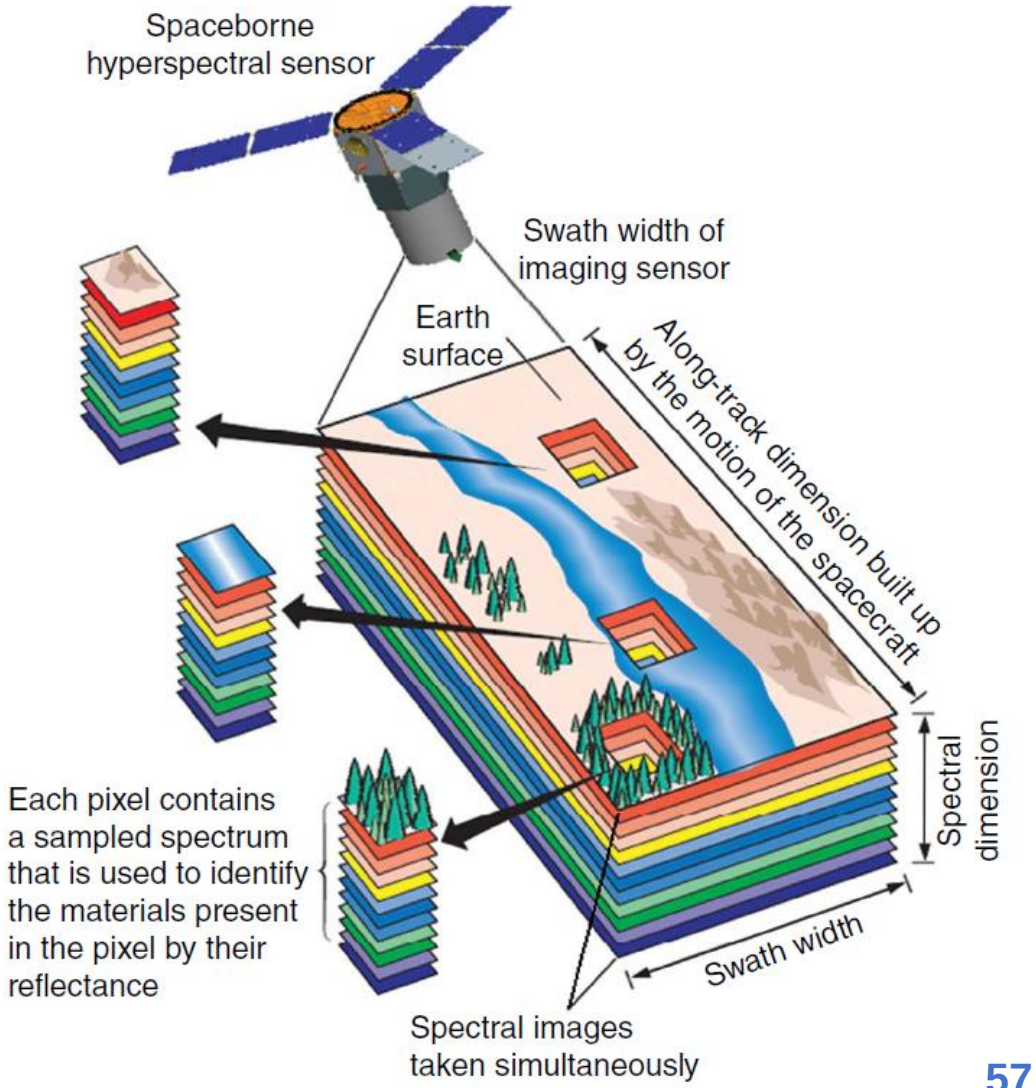


Image acquisitions

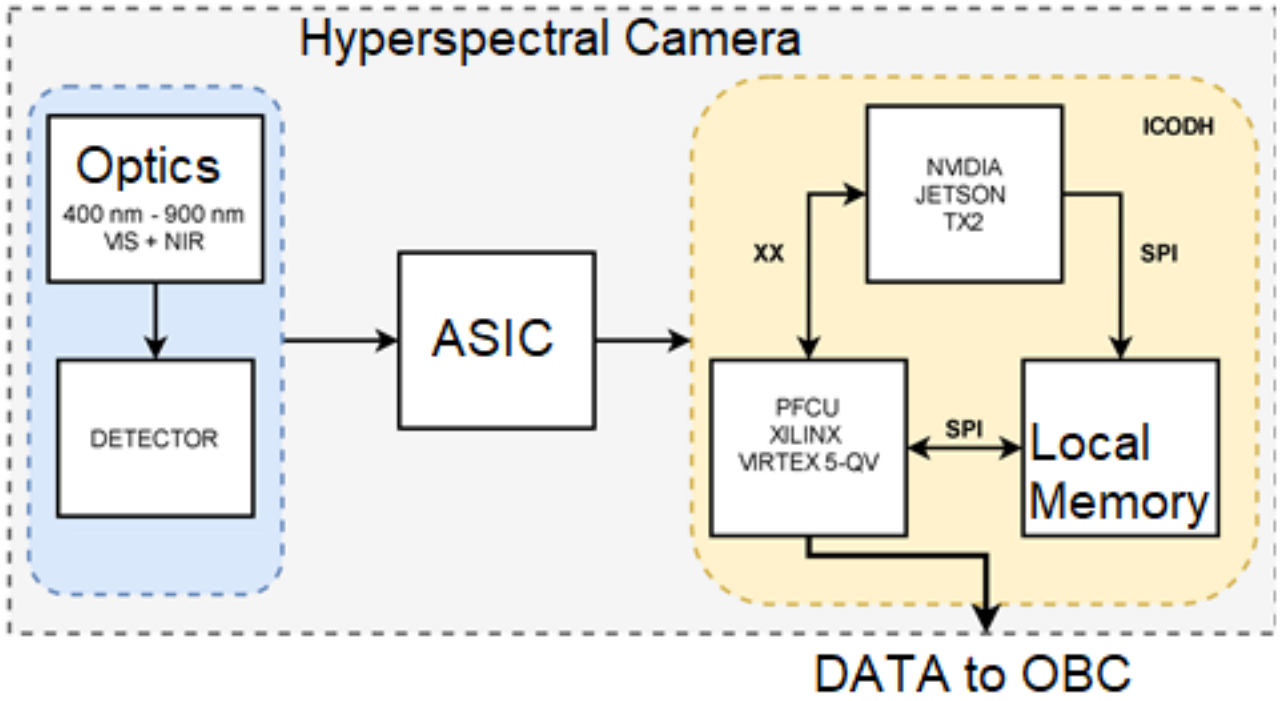




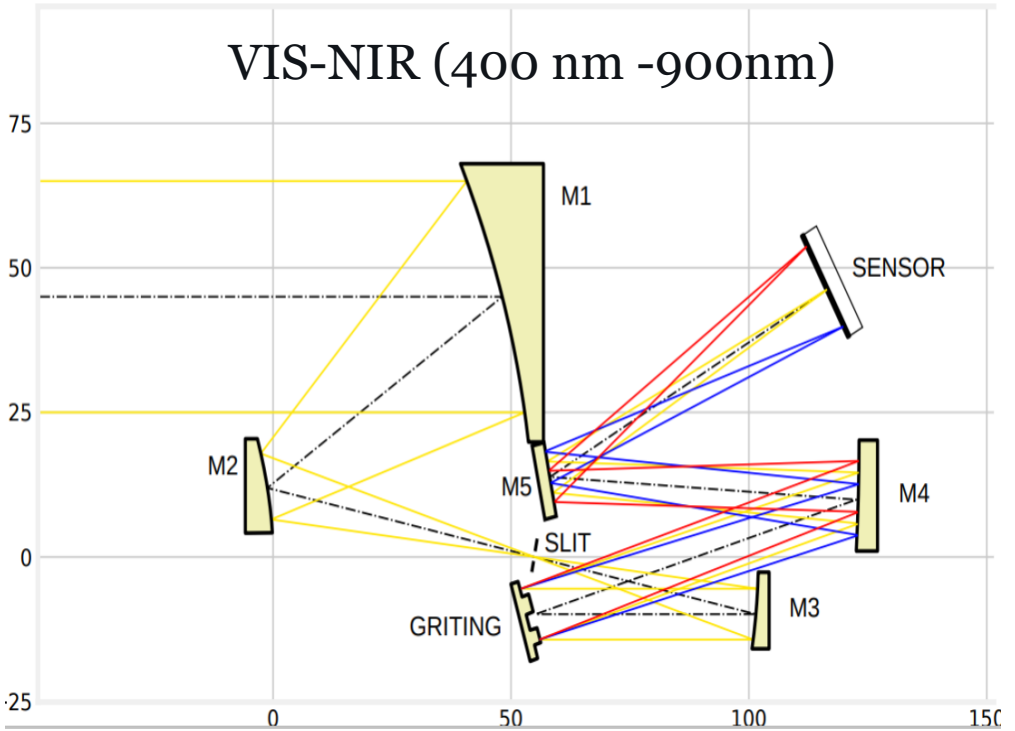


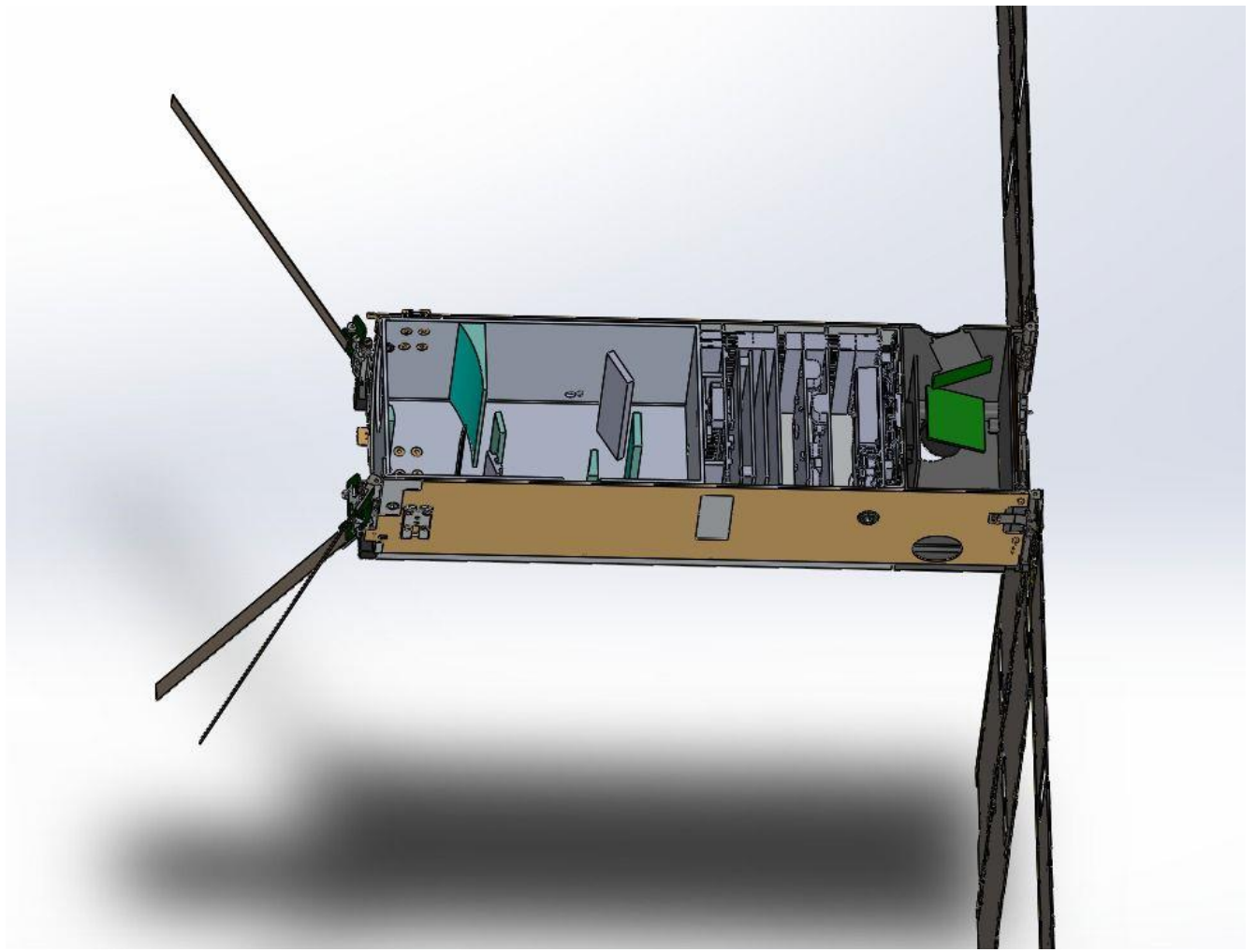
Fuente: Hyperspectral Satellites and System Design, Shen-En Qian

Hyperspectral Camera Architecture

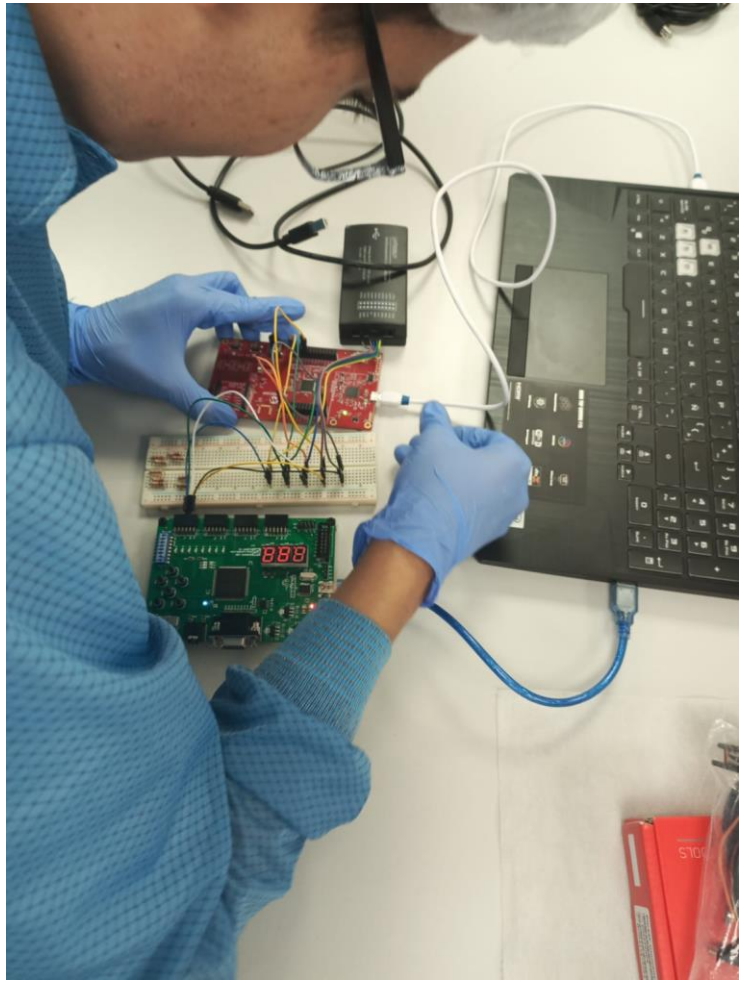


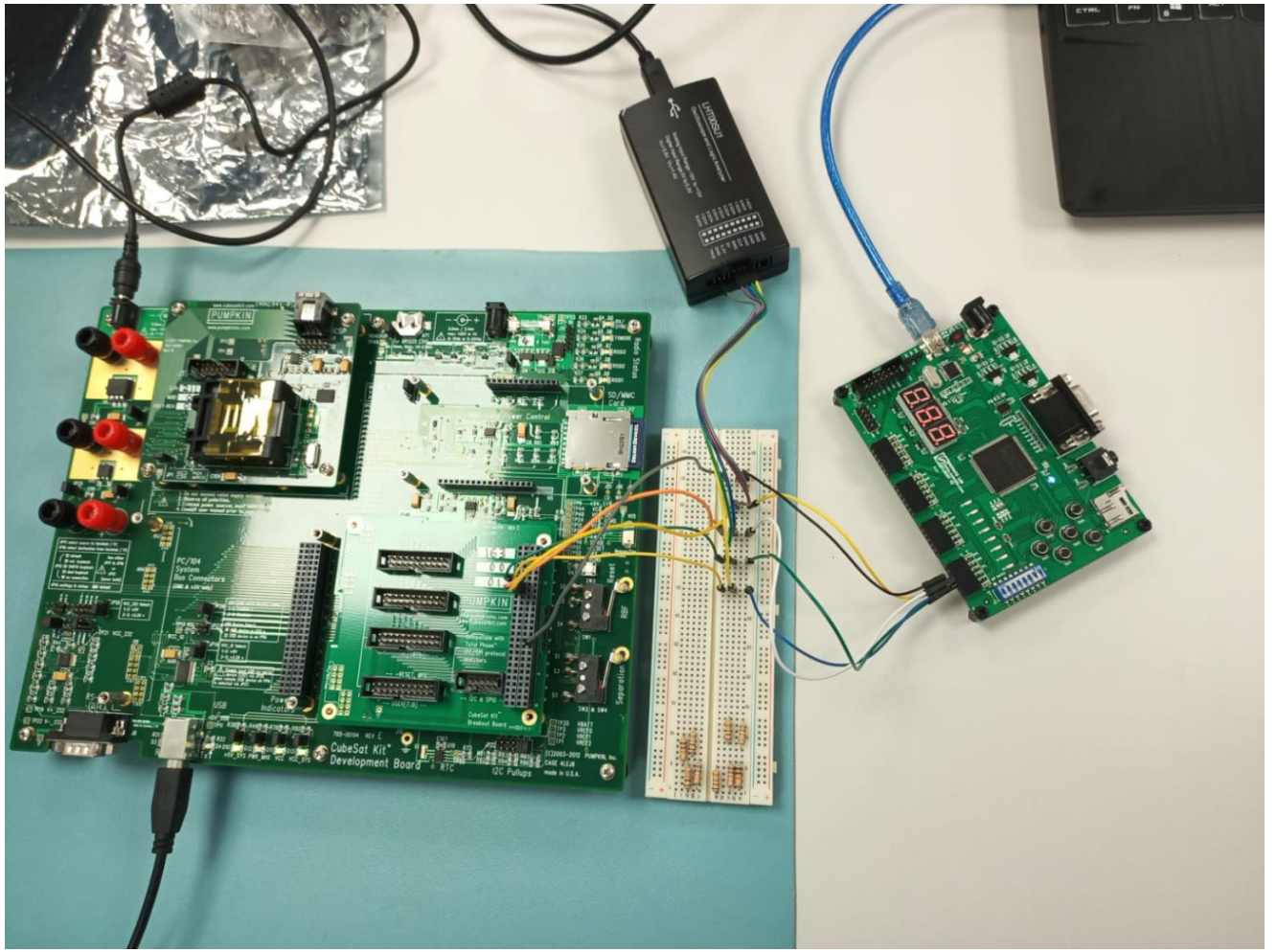
Instrument Optical Design



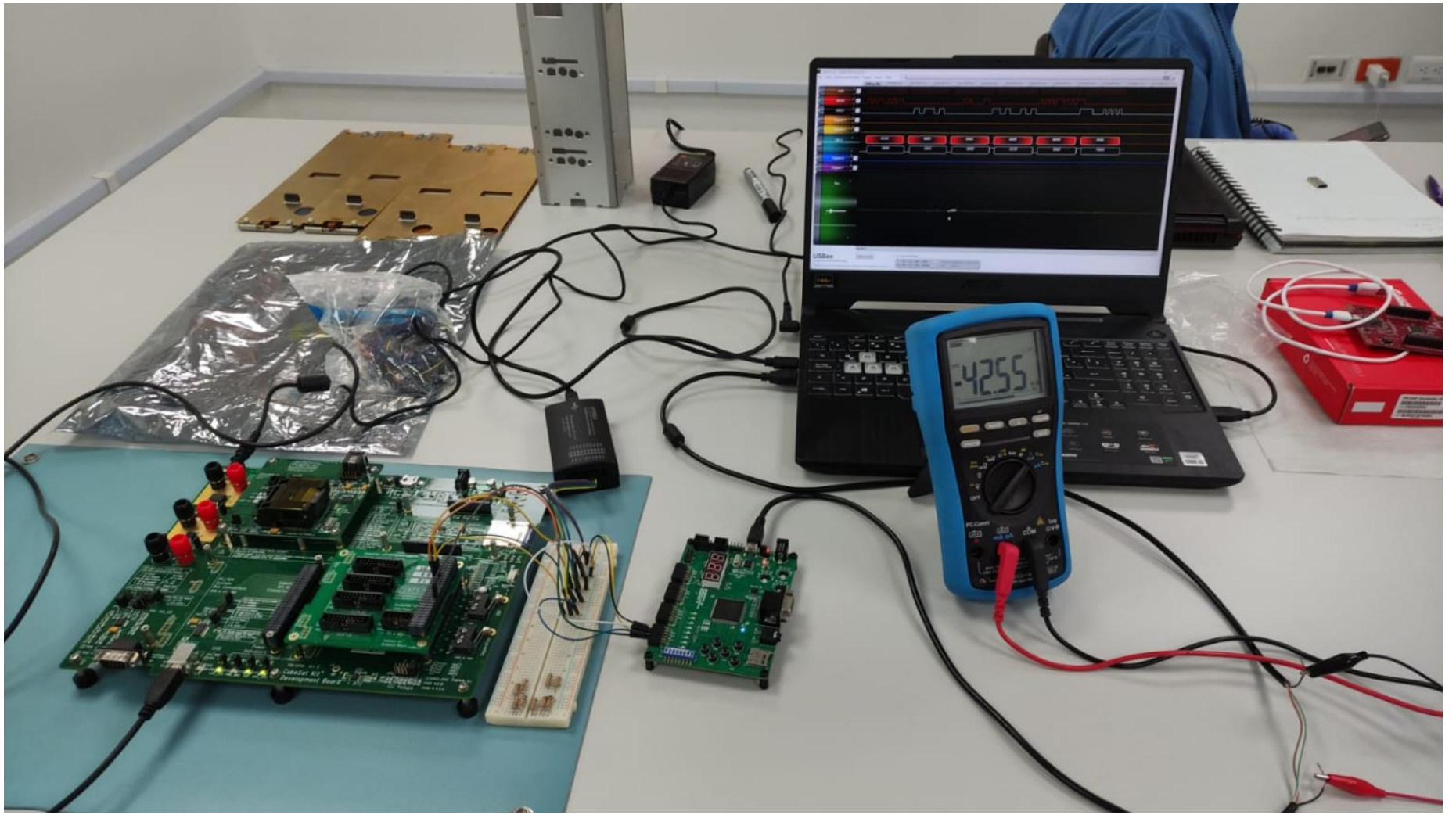


Test campaing at FAC

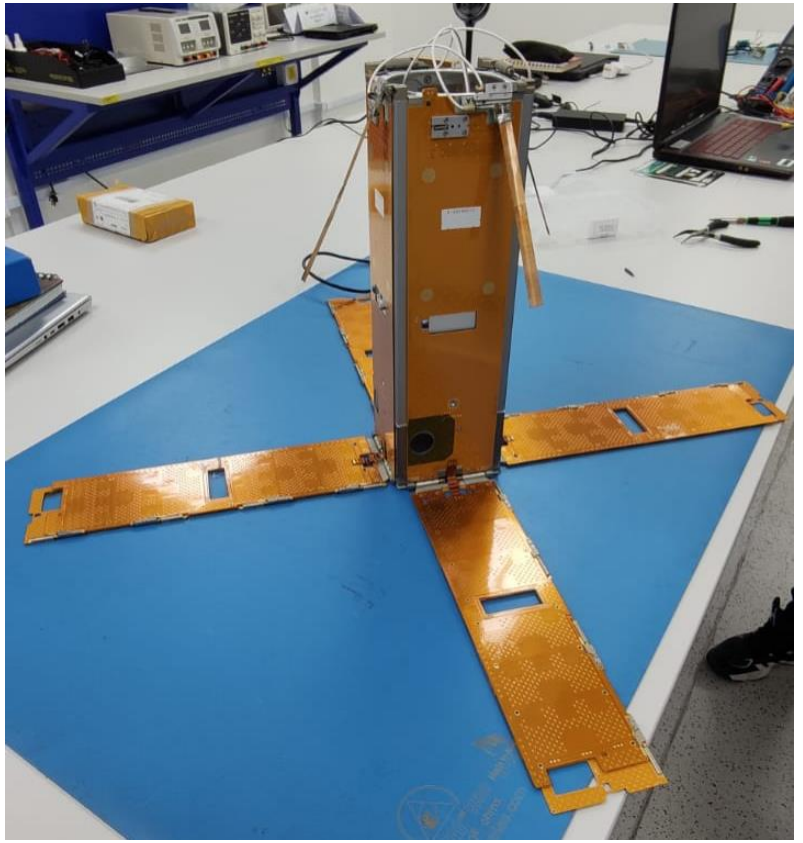


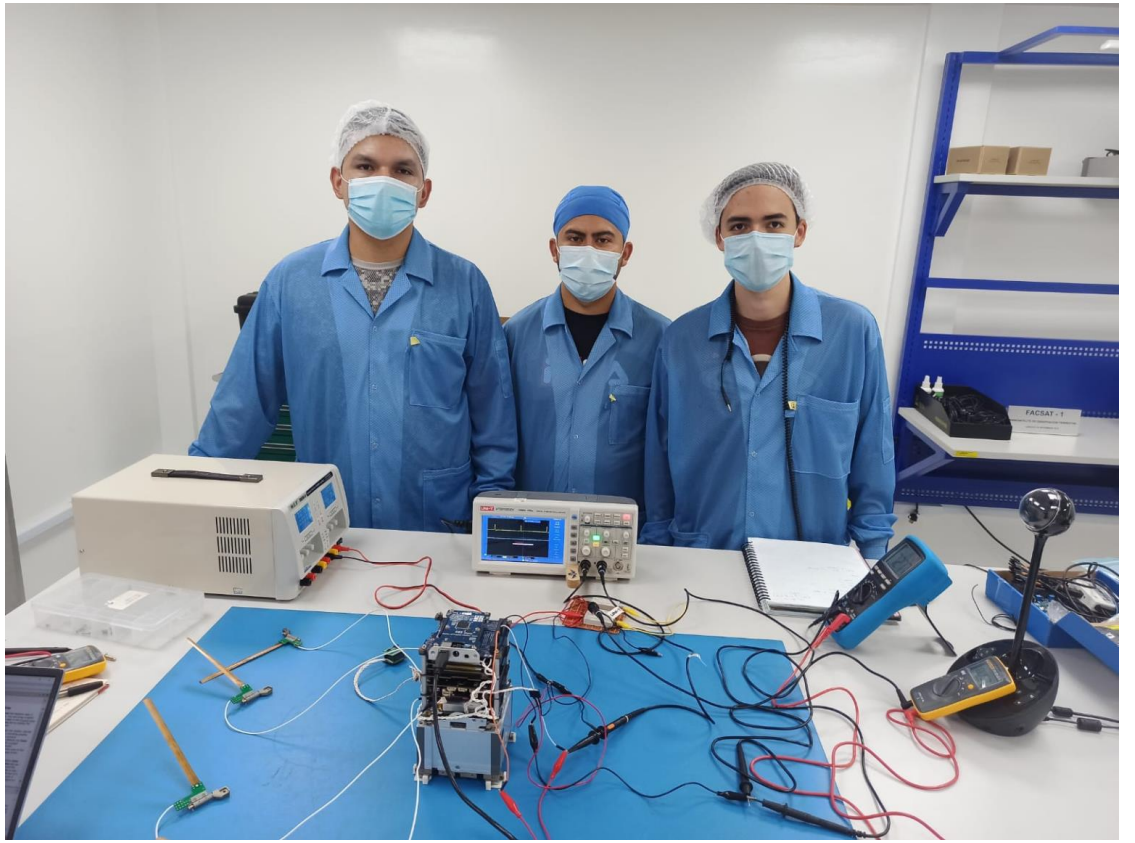


Test campaing at FAC

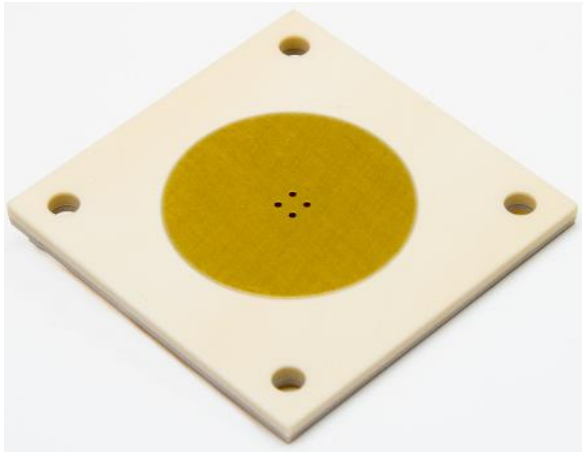


Test campaing at FAC

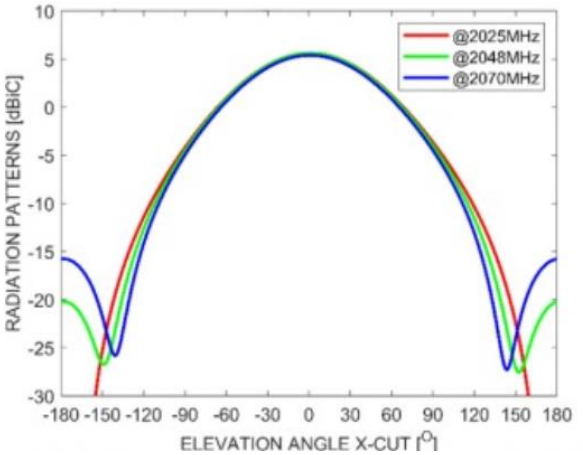




Space Segment: COMMS-S planar antenna



Circularly Polarized Antenna - Printech

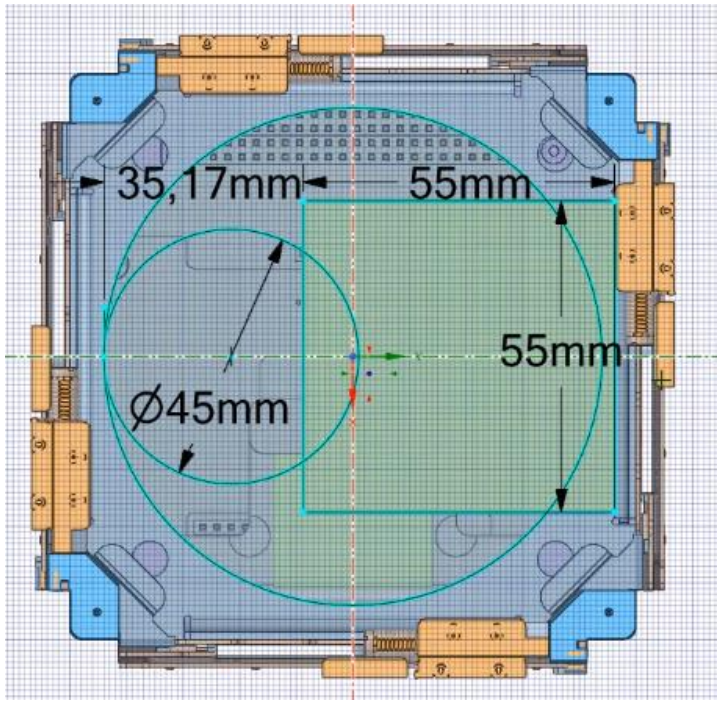


Radiation Pattern

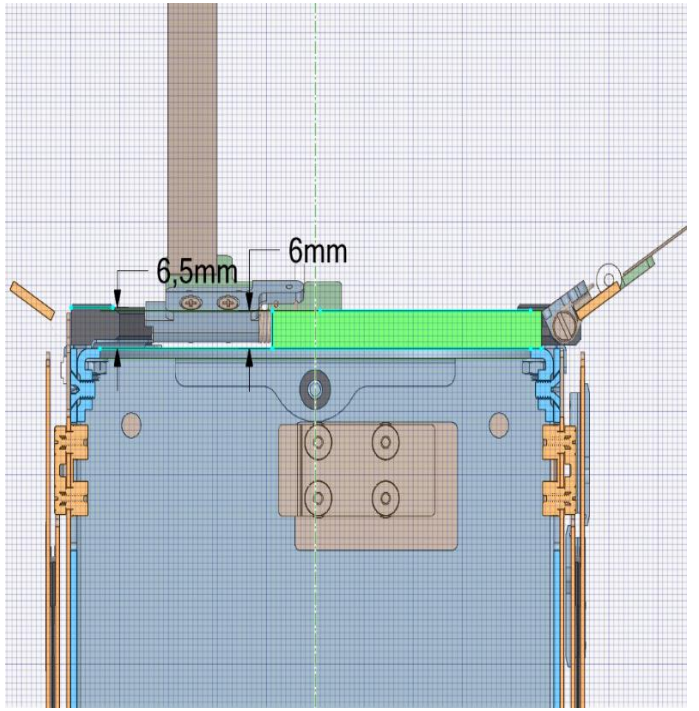
Description :
Frequency range: 2025 -2070 MHz. (variable)
Half Power Beam Width : 96° To avoid pointing losses, a pointing accuracy by the ADACS subsystem <20° (0.5 dB) is required.
Gain : 5.5 dBi Polarization RHCP
Dimensions : 55 x 55 x 6mm
Mass : 31 g
SMA female connector 50 Ω

Space Segment: COMMS-S planar antenna

- Ubicación:

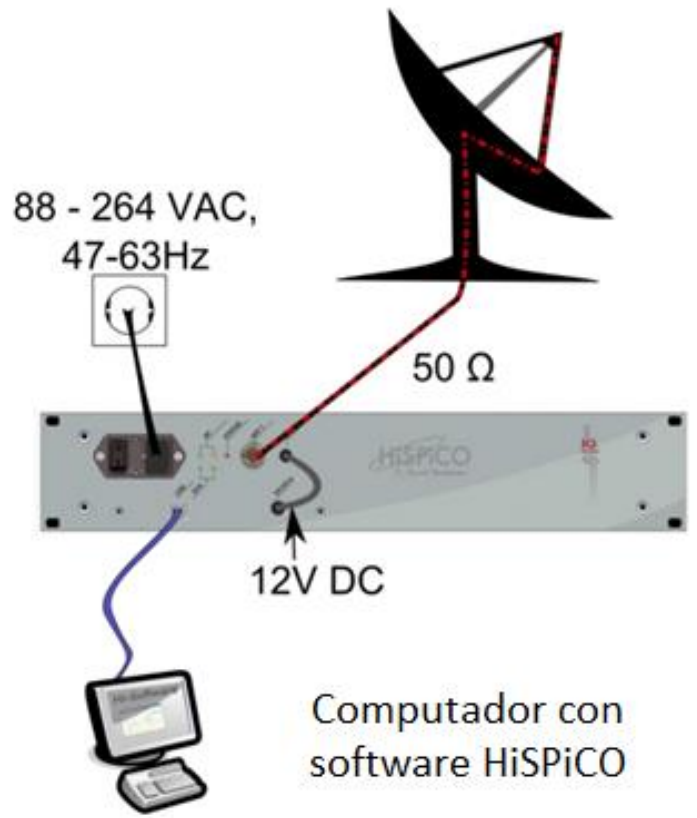


Vista frontal cara –Z LEOPAR



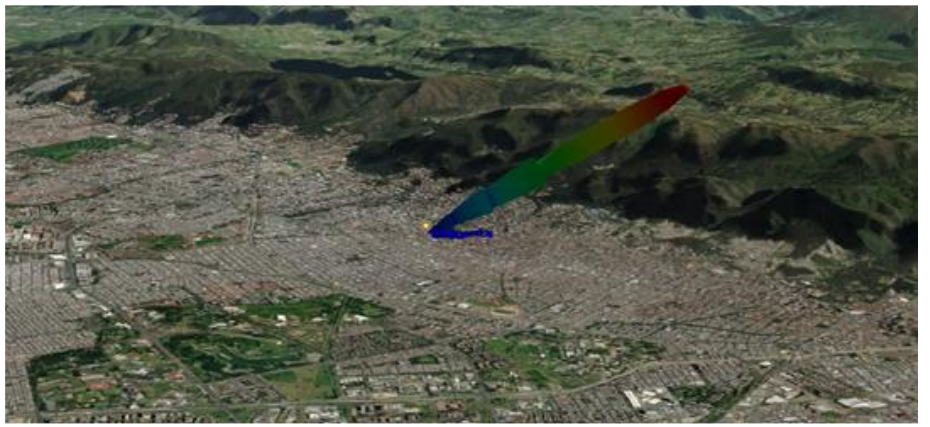
Vista lateral LEOPAR

Ground segment:



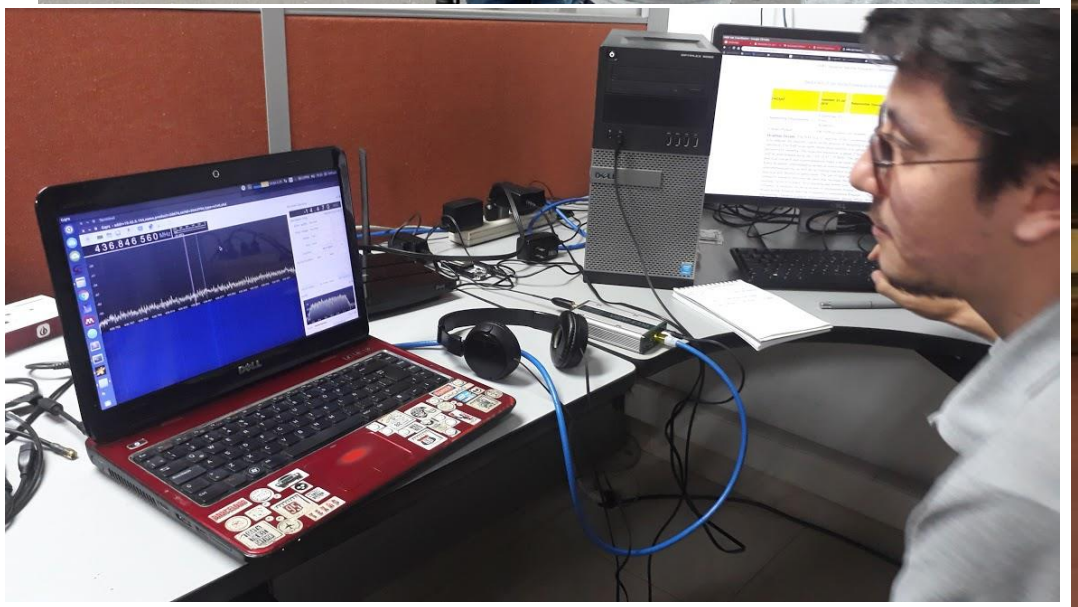
Esquema de estación terrena para HiSPiCO

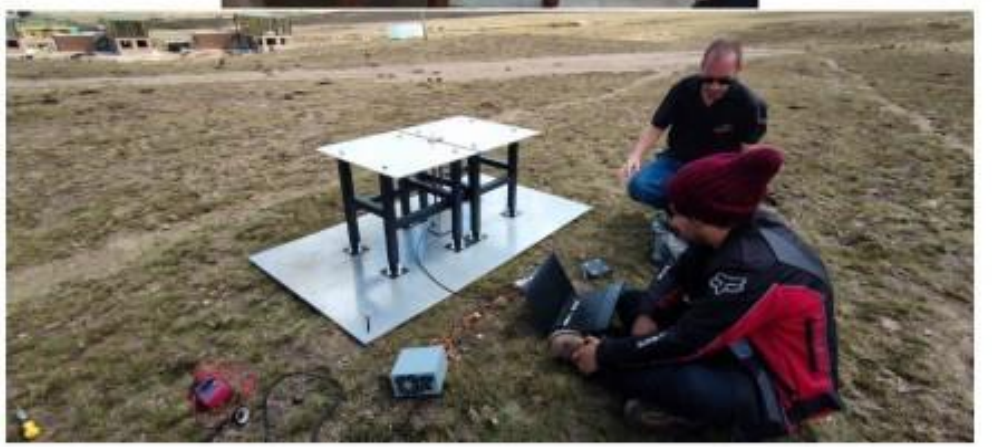
Description : Ground station by HiSPiCO Parabolic antenna of 31.5 dB of 1.9 m in diameter.
Center frequency 2250 MHz
Half Power Beam Width: 5.1°
A pointing error of 2.55° produces 3 dB of link loss.
To avoid aiming loss, a tracking accuracy of less than 0.5° (~0.2 dB) is required.
Gain Ratio / System Noise Temperature : 6.02 dBK
Total receiver loss considerations of 2.5 dB



Patrón de radiación antena parabólica.

Ground segments





9th colombian scientific expedition to Antarctica

Thank you !!!

Contact:

Dr. Julián RODRÍGUEZ FERREIRA

jgrodrif@uis.edu.co

Social media:

@cosmojules

@scuaspace